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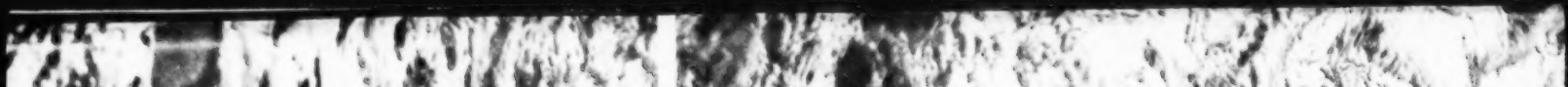


We can all learn valuable lessons from the survival experience of others, no matter what kind of aircraft are involved. This story happens to be about the crew of a helicopter. . .

HEADS-UP CREWMAN

On a night visual unit training flight, an SH-3A struck the water, rolled over on the right side, filled with water and sank. The four-man crew managed to escape uninjured although the copilot was in shock and the flight surgeon was dazed. Here is the survival narrative of the AX3, the heads-up crewman praised by both survivors and rescuers for his presence of mind during the time between accident and rescue:

"I felt two or three jolts and sat back down in my seat and grabbed hold. I then saw water shooting out of the sonar well. I turned my head towards my escape hatch and looked outside. Using the water surface as a reference, I had the sensation of being on a 90 mile-per-hour clockwise merry-go-round. I hit the lower left-hand corner of my escape window and remember seeing it rip out at least halfway. I reached out and grabbed the sponson strut with my right hand and still felt the clockwise spinning sensation.

"There was an abrupt stop and in what seemed just a matter of seconds (aircraft probably rolled to its right), the water came rushing in through the hatch and I was completely submerged. I began pulling myself out of the hatch quite easily until my life raft caught on the hatch. I wiggled myself free and began groping my way to the surface. I got my life raft entangled again on some part of the aircraft. At this time, it seemed as if I saw objects unrelated to the starboard side of the aircraft. It looked as if I had a sponson to my close left and a sponson to my close right. Of course, through the sea water, the objects looked vague and ominous.

"I finally snapped off my life raft with very little difficulty and began rising towards the surface. To expedite my rise, I managed to find my left life vest toggle and inflated the vest. I broke the surface and was afraid to take a breath of air because it all seemed so unreal. I couldn't believe I had finally made it.

"After a few seconds, I came to my senses and noticed the aircraft apparently floating upside down. The next thing I saw was somebody popping to the surface. It was the pilot. He swam to the aircraft. I followed him to the aircraft and grabbed hold. I then realized that it might sink at any second and told him we had better swim away.

"We both pushed out about 15 feet. . . That was the last time I noticed the aircraft. The pilot and I got together again and found out that we were both okay. My life vest wasn't giving me too much buoyancy. I remembered my right toggle, pulled it and heard the CO_2 cartridge activate. This seemed to give me more buoyancy.

"I then heard a third person calling for help. I left the pilot and swam towards the man. He was the flight surgeon who had been flying with us as

crewman. I held up his left shoulder with my left hand. He seemed to be in the same state of shock that I had been in temporarily when I first broke the surface. After a few seconds, he came to his senses and began acting quite normal for the circumstances. I then noticed that the pilot was alongside of the doctor and me. I believe I asked if anyone had a life raft still on him. The flight surgeon said he had one but could not find the toggle to inflate it. I reached down to take it off his person and at first he protested."

The flight surgeon's story is of interest here. He had become completely disoriented in his attempts to escape from the sinking wreckage. After failing to find the forward personnel hatch or the starboard escape hatch, he swam to the area of the faintly glowing dome light, thinking it was a hole with surface light showing through. Then in desperation he swam towards the glow caused by the sonar set cathode ray tube implosion and, in doing so, found the starboard escape hatch. He inflated his life vest and surfaced.

"I do not remember coming to the surface," the flight surgeon states. "I remember hearing voices and begging for help. My impression was that these were terminal hallucinations and I recall being thankful that I had insurance for the family. Then I became semirational and realized that people (the pilot and crewman) were trying to help me. I was convinced that my life vest had not worked and begged them to inflate my raft. However, I would not let the crewman take it from around my waist. After he threatened to inflate the raft with it still attached to me, I became more rational and allowed him to remove it and inflate it.")

"The three of us each held on to part of the life raft and treaded water," the crewman continues. "A few minutes later, I heard a faint call for help. I thought I saw a steady white light and told the other two that we had better start swimming towards it. As we pushed along, still hearing the copilot's call and calling out to him, I began to wonder if we were going in the right direction because each time his voice seemed to come from a different area. I believe now that this was caused by my hard hat. . . . Still believing that the copilot's white light was still quite a way off, we came across his completely dark silhouette about 15 feet in front of us. I swam to him and brought him to the raft.

"I then asked if anyone else beside the flight surgeon had a life raft.

(*The pilot had lost his raft. Failing to open the pilot's escape hatch, he had exited through the sliding window portion of the hatch. When the raft caught on the window frame, he had slipped it off over his hips.—Ed.*)

"The copilot said he still had his raft around him. I reached down and told him that it was not his raft but his survival vest. He said no, that the raft was on him. I reached around his waist and told him he was mistaking his survival vest for his raft. He then said to look around his legs and I quickly found the raft and easily disconnected it. With about the same amount of trouble I had finding the first raft toggle, I inflated it." (*During the copilot's egress from the sinking aircraft through a window, his life raft had also caught on the window frame. This had caused the raft pack to slide down on his thighs.—Ed.*)

"The pilot then linked the two rafts together with his arms. I asked him if he had any shroudline to tie the rafts together. I think he either told me that he did or that he was doing it.

"I had seen a helicopter in the area a few minutes before and so I commenced to light off the signal flare. At this time I noticed that my flight gloves felt slimy. After a few seconds of deliberation, I decided to take my right glove off and eventually I threw it away. I ignited the signal flare with no apparent results. I then noticed that the two officers had their strobe lights ON. I considered turning on my old-fashioned life vest light but thought that it might impair my vision and that the strobes outclassed it tremendously." (*SAR helo crewmembers described the survivors' strobe lights as "outstanding."—Ed.*)

"We then helped the copilot into one of the rafts.

"I tried to keep talking and virtually said aloud everything that came into my mind (*except* the threat of sharks) because I once read an APPROACH article about a pilot's rendition of his water survival. He had stated that he talked as much as he could because he read somewhere that it helps everyone psychologically.*

"We then spotted another helo approximately 3½ to 4 miles out and I asked one of the pilots to give me one of their distress signal flares. The pilot handed me one of his and said that the night end was up. I ignited it but wasn't sure if the helo pilot saw it. Instead of throwing the flare away, I told them I was going to light the day end to see what kind of results we could obtain. I think we all got a laugh at the sputter of sparks it gave out. However, it may have helped a little bit because the first rescue helo came at us upwind and the smoke trail, blowing down-

*For a portion of the article referred to by the pilot quoted, see page 4.

wind in his path, was reflected in his landing lights.

"I ignited my last distress signal flare at, I believe, the same helo I expended the second flare on. Before the flare had completely burned out, I knew the helo had us in sight and so I threw the flare downwind, almost in the helo's path and it went out.

"The helo came down on us in what seemed to me to be a rather hasty approach. The rotor wash blew in our faces and was blowing us around. I deliberated suggesting that we abandon the rafts, but after seeing that the helo was having difficulty maintaining a stable hover, my decision was that I was positively against it. At first, we all groped for the sling only to have it miss us or have it pulled out of our hands. Then it seemed that we all became indifferent to it and concentrated on protecting our faces from the rotor wash. I finally became so perturbed over the helo's unsuccessful attempts that I started to wave him away from us. He then tried a higher hover which cut down the rotor wash appreciably, and I gave him a thumbs-up. He still couldn't steady the sling enough and so he left the area, but I noticed he also left a smoke burning about a half-mile from us.

"Soon after the first helo left us, a second came in in a fairly high hover and got the sling fairly close to us with plenty of slack. I climbed out of my raft, and we grabbed the sling and started to put it around the copilot while he was still in the raft. I think we all decided that it would be almost impossible to get it around him while he was in the raft so I got on one side and started dumping him out and I believe the pilot and the flight surgeon were on the other end trying to get him out also. We finally got him in the water and the sling around him. However, there was a little too much slack out and the cable became entangled in some lines. We tried to untangle the lines but to no avail. I then thought of my survival knife and easily got it out of my thigh sheath and cut the shroud from the cable. (*The rescue report says that the crewman, after aiding the copilot into the sling, fastened the safety straps. The copilot was very weak and hung limp. He would have probably fallen out of the sling if the straps had not been fastened, the report states. —Ed.*) The copilot was hoisted uneventfully from the water. However, I noticed that the sling was low on his back.

"After being sprayed with helo rotor wash, I felt chilled and began shaking uncontrollably. I climbed into the vacant life raft and suggested that the pilot and flight surgeon wrap their legs around each other to receive each other's heat because I had noticed

". . . the rotor wash was blowing us around."

that while hanging onto the raft the copilot was in, I had brought my feet up to the bottom of it and felt his body heat. They did so and said it helped a little.

"After the copilot was hoisted aboard, the pilot and flight surgeon got into the rafts. Trying to expedite my pickup, I made the mistake of leaving the rafts and swimming towards the sling which was in the water nearby. Almost immediately, the rafts were blown about 35 feet from me. Fortunately, I made it to the sling and was hoisted aboard uneventfully. The sling was low on my back which resulted in a slight sprain.

"When I got aboard, I was directed by the rescue crewman to go forward. I went forward to see how the copilot was doing. He said he was cold and I rubbed his legs a bit and returned aft. I then told the crewman to tell the pilot to maintain the highest possible hover to prevent rotor wash.

"The pilot came aboard next and I helped him to his seat. A little later the flight surgeon was aboard and we all sat forward. I asked the copilot how he felt and he stated that he was still cold. The pilot, flight surgeon, one of the rescue crewman

COOL HEAD

How many times have you heard somebody say "He hit the panic button" or "If you can keep your head when all about you are losing theirs, you just don't have the big picture!"? But what panic can do to you in a survival situation is no laughing matter. Water survival or escape from the cockpit of a ditched or burning aircraft leaves no room for error. Panic can be quickly fatal. And even on land in an extended survival situation where time is not so much against you, panic can still cause you to make a fatal mistake.

Fear triggers panic but panic does not have to inevitably follow fear.

"It is particularly true that situations that are filled with intense personal danger are invariably accompanied by fear," the authors of "*Survival in Water*" write. "Fear is the body's way of providing an emergency response to an unusual or unexpected stress. It stimulates the individual physically and mentally for the purpose of better preparing him to cope successfully with the danger that confronts him. However, depending on the make-up of the individual, his early background, training and experience, and the training he has had in the job he is doing, he is able to accept the fear and all of the discomforts which go with it or he is panic-stricken by anxiety and is rendered ineffective.

"Familiarity, experience and training act as buffers and protect the individual from a disorganizing psychological response. . . A trained and seasoned man has greater flexibility and is able to bend with the stress, so to speak, without breaking. Conversely, unfamiliarity, inexperience, and a poor quality of training or too little training are major causes of abnormal mental and emotional reactions."

If you know what may happen to you and are prepared, you are less apt to panic.

A group of the country's leading psychologists, writing for the Armed Forces in World War II, stated, "Knowledge of the situation lessens fear. The unfamiliar is always more fearful than the familiar. Habit makes fear less effective. Fear is disorganizing—it makes men less alert, takes their attention from important matters, causes them to act for inadequate reasons."

The antidote for fear and panic is training, training and more training.

Training can make the difference between life and death when a pilot or crewman parachutes into the ocean or has to escape from the burning cockpit of a crashed plane. Training is equally important in survival on land.

"The greatest hazard in a survival situation is not wild animals, exposure or starvation. It is fear," the USAF Flight Surgeon's Manual states. "Fear destroys

and I massaged the copilot and talked about the accident the few minutes it took to get to the beach."

The flight surgeon survivor had high praise for the crewman: "He kept talking to us and is *solely* responsible for keeping morale up. . . He deserves to be commended for his lifesaving work in keeping up morale." As the SAR helo crewman described him in his statement to the Board, "This crewman was really heads-up!"

"In regards to the night survival evolution," the AAR states, "it is interesting to note that a relatively well-equipped and trained crew in warm weather, inshore environment still experienced difficulty. A lesser degree of training could have easily been the difference between a fatal and non-fatal accident. Of the many survival aspects of this accident, the most pertinent and surprising is the difficulty experienced in inflating the life vests. All other survival equipment is secondary."

(NASC has made recommendations to BuWeps that all helos be equipped with externally mounted, automatically inflated multiplace life rafts.—Ed.)

a man's ability to cope with other hazards in an intelligent manner. Individuals who make an emergency descent in a strange terrain suffer from what is sometimes called 'mental shock', which is characterized by fear of the unknown, confusion, indecision and inability to organize activity or to make a sensible plan of action. This syndrome lasts for varying periods; in those who are aware of the principles of survival the period is short. In those who are unprepared for an emergency, fear and confusions are likely to jeopardize their prospects of survival and rescue. This is the fundamental principle to be emphasized in survival training: A man can survive in practically any climate or environment even though he has but a minimum of equipment if he makes proper use of that equipment and takes proper advantage of his surroundings." Thus, training is the basic factor.

There are other lesser factors which can also contribute to keeping down fear and panic in a group survival situation, whether on land or at sea:

- *Leadership*
  An essential quality of the good leader is imperturbability and undeviating stability. A leader's calm behavior lessens fear in others for both fear and self-possession are contagious.
- *Humor*
  In trying times and tense moments, a laugh can be a lifesaver.
- *Companionship*
  The sight of another man who does not seem to be panicky is reassuring. Roll call also helps by reminding men that they are not alone. For example, the Army artillery's "Call out your numbers loud and strong" reassures each man through the smoke of battle that the others are still in their places, doing their parts and that they want to know that he, too, is still there, that they are thinking of him. The same thing applies to groups of survivors in the water, especially in darkness.
- *Physical Fitness*
  And in all survival situations, individual and group: good physical condition works against fear.

But by far the best weapon of all against panic is training . . . training in emergency procedures and survival equipment until your actions become routine and automatic. Provided the action is correct, "act first, think later" is not bad advice for a survival situation. To help you acquire correct reflex responses to emergencies the Navy provides flight simulators, ejection seat mockups, bailout trainers, Dilbert Dunkers and survival schools. Take advantage of them!

As one Navy flight surgeon told his pilots some time back, "The only way you will be able to survive an emergency is to have a tailor-made reaction for the situation pre-wired and planted in the dusty recesses of your skull, ready to transmit as soon as the button is pushed. If you don't have one, that button will activate another standby circuit which is very effective indeed. The name of the other circuit is PANIC."—*May, 1961* APPROACH

LOOK AROUND AND LEARN

By LCDR L.C. O'Neill, Jr.

It is a month before the neighboring squadron's Administrative/Material Inspection. Their skipper has asked your squadron to conduct a preliminary inspection to help point out any areas of weakness.

During this preliminary inspection you examine your counterpart department in the other squadron. You notice that they have an effective way of charting their training achievements, an efficient tickler system for recurring reports, and a remarkably unique plan for eliminating a problem that has been bothering your department for some time. You also notice a few things that require further attention to be ready for inspection and point these out to the other squadron.

When back in your own spaces, you realize that by adapting several techniques and procedures you saw in use at the neighboring squadron you can improve your own organization considerably.

In some circles borrowing ideas or techniques from neighbors is frowned upon; in fact, copyright and patent laws go into great detail to discourage such practices. In the Navy we are fortunate that we can trade successful ideas and techniques back and forth. It is even encouraged! This is the idea behind NATOPS, NWPs, doctrine letters, SOP, etc.

Unfortunately too many of us are either too proud, too "bull-headed," or too lazy to look around and see if there is already a proven solution next door. Maybe we just like to be original and figure things out for ourselves.

But how much more experience we could draw upon if we would just look around—and learn! We already apply this principle in the area of aviation safety. It has been highly effective to learn from the *mistakes* of others. The aircraft accident rate has decreased steadily year after year. Why not learn from the *successes* of others, too?

As mentioned before, the squad-

Why not learn from the successes of others . . . ?

ron right across the hangar might have just the answer to that problem you have been wrestling with for weeks. Drop over for a cup of coffee and talk "shop." Let them know you would appreciate some help. They will be proud to have been asked. It is even possible to cut across tradition into different types of squadrons. The tail-hook gang just might learn something from the VP people, and vice versa. "Jet jocks" might find the solution to some of their problems in a "Spad" squadron's ready room. Don't be too clannish, gang. The attack folks might learn something from the fighter types. The whirlybird pilots might pick up a trick or two from the fixed-wing drivers. And, oddly enough, we "Airdales" might even learn something from the "Black Shoes." The only requirement is to realize that someone else may have already worked out an effective way to do just what we are racking our brains trying to figure out. Once we realize that a ready-made solution might be available, then we can look around for it.

On your next cross-country kill two birds with that stone. While you're getting your bird refueled and serviced, look around and see what you can learn, security permitting, of course. At an Air Force base you may even find that our friends in light blue have some good ideas. Plan ahead! A visit to the manufacturer's flight line often yields a few useful insights on your equipment. Might even pick up some hot dope that never made it into the Flight Manual or the NATOPS Manual.

Certain types of administrative and clerical problems may not be peculiar to the Navy. Perhaps a venture outside the gates to the personnel office of a nearby corporation or the training division of a local manufacturer might yield an answer. Sometimes they have a similar problem and have a solution that may be adaptable for your use. . .

The next time you are stuck trying to solve a problem, if the answer doesn't come right to mind or if you are not completely satisfied with your solution, stop and think. If it is likely that someone has been faced with a similar problem and already has a workable solution, maybe you can profit from their experience. The solution might be in the next office or the next hangar. Maybe you will have to travel to another duty station or even out of the Navy for help. But don't be hesitant—don't be too proud—seek help if it is available. Look around—and learn!

An investment in knowledge pays the best dividends.

Benjamin Franklin

Bad Day at Black Rock

A *Crusader* had diverted from the ship to NAS Black Rock due to a utility hydraulic failure. Upon his arrival, the pilot advised the tower of his difficulties and requested the midfield arresting gear. Since an A-4 had just taken the gear, he was given a 12-minute delay while it could be re-rigged and an F-8 qualified LSO could be dispatched to assist.

When clearance was received, the pilot lowered the landing gear handle.

The wheels did not go down. To pneumatically lower the landing gear, the wheel handle was then rotated and pulled. After a short delay, a down-and-locked indication was received.

When the pilot grasped the wing incidence lock handle, he found that it wouldn't move more than ¼ to ½ inch. Both hands and considerable force were used in an attempt to actuate the wing lock handle.

No luck! The wing wouldn't unlock!

After consultation with the LSO, the decision was made to land the aircraft with the wing down. A straight-in approach was commenced—gear DOWN, wing DOWN, droop UP, tailhook DOWN and with about 1800 lbs of fuel. Airspeed during the approach was 158 to 160 kts.

Touchdown was 500 ft short of the arresting gear at about 160 kts. Throttle was decreased a few percent upon touchdown and the aircraft maintained a nose-high attitude until engagement. Although the hook contacted the No. 1 pendant on centerline, it didn't engage it. The No. 2 pendant was engaged about two feet left of centerline. Initial arresting force was fairly strong until the pendant broke. The broken pendant, which had parted at the port swage fitting, whipped forward from the port side; wrapping itself around both main landing gear, severing large parts of the lower wheel well doors, and damaging or rupturing both main landing gear shock struts.

Immediately after the pendant broke, the pilot noted a vibration similar to that of a blown tire as the aircraft continued rolling down the runway.

Military power was added and back pressure applied.

The aircraft would not rotate sufficiently to take off!

Afterburner!

As the aircraft rotated, the arresting hook linkage was jammed into the pavement. Amid a trail of sparks, smoke and flame, the *Crusader* became airborne. As the plane lifted the tailhook dropped free from the airplane and fell to the runway.

Climbing straight ahead, the pilot deselected the

With the variable incidence wing locked in the down position, arresting hook missing, both main landing gear shock struts broken or ruptured plus other damage, the decision was made to eject.

burner at 1500 ft and took stock of his predicament.

Immediately the yaw stab warning light illuminated. A quick check revealed that PC-2 pressure was at or near ZERO; however, the PC-1 pressure remained steady at 3000 psi.

An A-4 joined the *Crusader* and provided a damage report. About five minutes later, another RF-8A from the ship joined up and gave a more accurate assessment and evaluation. The arresting hook was missing from the aircraft; port main landing gear shock strut was broken but still attached to the plane; a rupture in the starboard shock strut, large portions of both main landing gear wheel well doors were missing and considerable skagging damage was evident in the tail cone area. The inspecting RF-8A pilot did not believe the aircraft could be landed successfully and he therefore recommended ejection.

Another attempt by the pilot was made to unlock the wing. He found that the wing incidence lock

The tailhook dropped free and remained on the runway.

handle could now be moved to the *unlocked* position. He then raised his pneumatic landing droop guard and attempted to actuate the landing condition droop.

No change in droop position was noted and no further attempt was made to raise the wing.

The situation was further discussed with the pilot of the other RF-8A, the LSO, and the Commander of the Fleet Air Detachment in the tower. Since time and fuel considerations prohibited an alternative of foaming a runway for landing, the pilot made the decision to eject.

Enroute to an unpopulated area, the other RF-8A photographed the damaged part of the aircraft and positioned his plane to photograph the ejection.

With a fuel state of 800 lbs, the aircraft arrived at the ejection area—just below the overcast at 7000 ft, 175 kts and on a heading toward the sea. The pilot transmitted his position, trimmed the aircraft nose-down, secured the engine and ejected. (Pictures are on pages 24 and 25.)

All escape equipment functioned normally, including the PRT-3 radio.

After landing uninjured in a farmer's field, the pilot was immediately picked up by a rescue helicopter that had been dispatched from Black Rock.

Return to the air station was uneventful until about three miles out.

The helicopter had an engine failure and crashed into the trees! Although the chopper received strike damage, there were no injuries.

Reluctantly, the *Crusader* pilot climbed aboard another helicopter for his second rescue of the day.

"This just isn't my day," the pilot thought while waiting for the second helicopter to arrive.

The crux of this accident involves two considerations: two emergency procedures that were diametrically opposed, and the engaging speed/strength limits of the arresting gear.

Utility hydraulic failure in the *Crusader* is not normally serious in itself. NATOPS calls for a short field arrestment with touchdown close enough to the arresting gear to insure engagement before directional control is affected.

This point could be from a few thousand feet before the arresting gear to touchdown in the gear itself—depending upon the aircraft components that were disabled.

A *Crusader* wing-down landing calls for a long field arrestment—normal touchdown on the landing runway and engaging the arresting gear during the rollout.

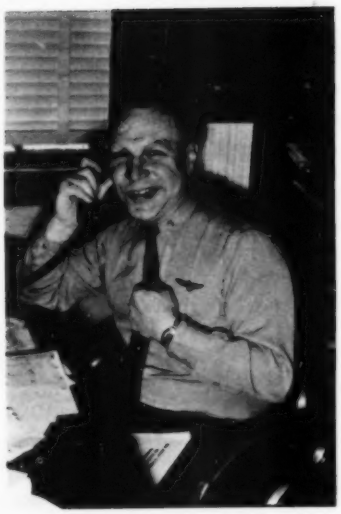
Obviously, the optimum solution in this case would have been a long field arrestment going into the gear just prior to losing rudder control (about 80 kts). Why then, did the pilot elect to engage the midfield arresting gear at 160 knots? The primary reason was "bum dope."

Upon his arrival at the arrestment site, the Landing Signal Officer was informed of the *Crusader's* difficulties and intentions. The Crash and Salvage Officer at the scene confirmed that the arresting gear limitations were 160 kts at a gross weight of 30,000 lbs. The LSO instructed the pilot to fly the aircraft into the gear at 160-165 kts. The die was cast at this point.

Investigation revealed that the arresting gear bulletin recommended a maximum engaging speed for a 20,000 lb *Crusader* of 144 kts. This is the velocity at which the F-8 would pull out the chain to the bitter end. Engagements exceeding the recommended weight-velocity capacities can be expected to whip the chain ends, propel broken links to distances of more than a half-mile or, as in this case, snap the pendant.

How did this erroneous data find its way into the hands of two responsible people? The applicable arresting gear bulletin indicated an absolute maximum of 165 knots for any weight. When the correction is cranked in *accounting for the length of the chain*, this figure is reduced considerably. The figure that both the LSO and the Crash and Salvage Officer had was inaccurate for this reason and had a profound effect in the outcome of this emergency.

Are copies of arresting gear capabilities available to the squadron LSOs of your air group? More importantly, have they been instructed in how to use them?



So you're going to be a SAFETY OFFICER?

Soon after you report to the RAG for replacement training you begin to hear ominous rumors from the future squadron. It seems that the aviation safety officer has received orders and you are under consideration for the job.

You immediately know that there must be a mistake and take reassurance in the fact that the first-tour LT in the preceding class and the LCDR selectees in the following class are eminently more qualified for the job than you.

After all, you weren't completely sold on that safety stuff during your first tour; it took about six months of cheating death in the back seat of a T-28 in the training command for you to decide that the safety program really did have its merits. As the check-in time gets nearer, the more authoritative the reports are that you are to be the new ASO.

You do some more reflecting as you remember the safety officers from your first squadron. One in particular stands out. He would get that far away look in his eye when he talked of the lowered accident rate and become as riled up over human error as the little woman does over Friday afternoon happy hour. You wonder if you can live up to the image. All doubt is removed when you check in and meet the XO. The safety officer's job has been vacant for two months and as of right now it is your baby.

What do you do? Where do you start? What constitutes an adequate safety program? My intention is to provide some of the answers to these and other questions that the new safety officer might have and also to talk about ideas that might benefit the experienced ones.

As the new ASO, condition yourself to approach this new job under the premise that accidents can and must be prevented. They reduce the overall readiness of the Navy, and are extremely costly in lives and money, to say nothing of the enormous amount of extra work they cause the ASO.

Be the Best

Your earliest actions as ASO should be to gain the confidence of your fellow officers and the crew. Lay the groundwork in this respect by becoming generally accepted as the most knowledgeable aviator in the squadron. Strive to be the best aviator in the squadron (don't ever confuse best with hottest). This can only be accomplished by many hours of detailed study of the NATOPS Flight Manual and by consistently being at or near the top in all phases of flight competition. By being looked upon as a top-notch aviator, you show the few skeptics that the safe way is also the best way. Finally, prove your aeronautical abilities to the point that you become a member of the Instrument Flight Board, Standardization Board, and the Planning Board for Training.

By LCDR D. B. Pitts
Aviation Safety Officer, VP-49

CO's Help

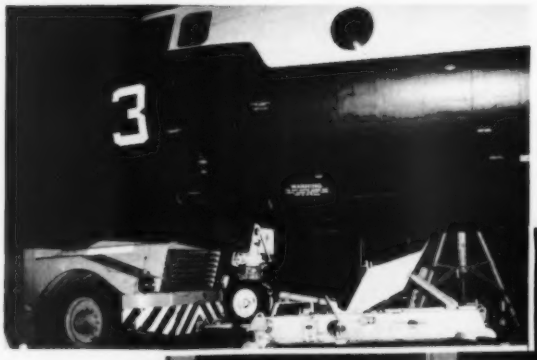
No matter how much personal effort you put into your job as ASO, it is impossible to have a bangup safety program without the all-out backing of the commanding officer. Most COs have long been sold on the program. You are indeed fortunate if your CO puts primary emphasis on readiness, safety, and standardization. A CO can help elevate your safety program by assigning you no collateral duties, giving you department head status, expressing strong support for your program to all hands, and maintaining an "open door" to you in matters relating to safety.

Develop and Maintain Good Relations

Since an effective safety program requires close coordination with all departments, it is imperative that the ASO develop and maintain good working relationships. Let the parties concerned have a chance to correct unsafe practices before taking the matter to higher authority. Running to the CO with a problem that could have been solved by the cognizant department head is one of the surest ways to defeat your own program.

Shop chiefs, technical representatives, line personnel, . . . are invaluable sources of suggestions and information. Once you win their confidence, you can count on them to come to you with their ideas and help you solve your technical problems.

For example, the main entrance ladder locking device on P-3As proved unsatisfactory immediately



Regardless of how effective your safety program is, there is the ever present possibility of an accident.

One of the best means available to the ASO in finding and eliminating accident potential is the Enlisted Aviation Safety Council.

upon receipt of the aircraft. The possibility of injury to personnel using these ladders was discussed at an enlisted aviation safety council meeting. The airframes chief was asked to study the problem and recommend a solution. Within a week he designed and installed on each aircraft a simple locking device that satisfactorily held the ladder in place.

Your friendly flight surgeon is another valuable source of information in your fight against accidents. He will most likely downgrade the delivery of babies and the prescription of pills to assist you in your safety program.

Accident Prevention

Hanging a copy of APPROACH in each stall of the officer's head and expounding on the evils of strong drink the night before a flight are time honored duties, but you also have other specific duties that warrant discussion. In general, your efforts should be devoted toward two goals: accident prevention and if an accident occurs despite your efforts—accident investigation and reporting.

The extensive Naval Aviation Safety Program is designed to help eliminate accidents and you should therefore devote the major part of your efforts to-

ward that goal.

Begin by trying to make all hands safety conscious. A good starting place is the all pilots meeting. Plan to have at least one period a week devoted to safety. Always be well prepared. Getting up "half baked" will destroy confidence in you and your program. Enliven your presentations with training aids where available. Involve the junior officers in your safety program by letting them speak on safety related subjects at the APMs.

Well-placed posters and signs help achieve safety consciousness. Change them frequently enough to avoid that neglected look.

Get your reading material in the user's hands while it is still timely. Each shop should have a copy of APPROACH and you might consider delivering it personally, not only to insure receipt but to show your interest to all hands. Ensure that both enlisted and officer ground and flight personnel have access to the *Weekly Summary, Crossfeed, Engine Summaries, Accident Summaries,* applicable special studies and contractor-furnished *Field Service Digests.*

Articles pertaining to an immediate safety item should be placed on a "Pilots' Daily Mandatory Read Board." Call attention to this board by marking it in an eyecatching manner. Red stripes on a yellow background might do the trick. Its location should be so strategic that every pilot will see it prior to mounting his machine. Keep material that is not vitally essential to "Today's Flights" off your Daily Mandatory Read Board—to do otherwise will destroy its value.

You may also stimulate safety consciousness in flight personnel by rigidly enforcing the proper inspection and wearing of survival gear. One way to accomplish this is to personally check the pilot (or crew) for the presence of all required gear. Or you might encourage proper preflighting of the life jacket by putting a red CO_2 bottle in a mae west at irregular intervals and rewarding the man that spots it on preflight with a case of beer.

Survival equipment discipline may best be enforced by the crew itself. Assuming prior agreement among the crew, let the man who breaks a safety or survival equipment rule be assessed one beer, payable at the next crew party.

Not wearing metal identification tags, flight boots, hard hat, survival knife, flight gloves, life jacket, parachute harness, or forgetting to preflight the life jacket and parachute would be sufficient causes for beer assessments.

Timely distribution of safety material is a means of getting your personnel to THINK safety.

Eliminate Accident Potential

While creating safety consciousness we must also detect and eliminate accident potential.

This may be accomplished by *surveying* the various squadron functions that relate to safety.

While surveying the maintenance department, ensure that the maintenance procedures used to process aircraft discrepancies are adequate. To do this go over yellow sheet, work order, FUR, and quality control procedures thoroughly.

Another important area to check is the maintenance of the technical library. In this respect, place particular emphasis on compliance with maintenance directives from higher authority. Also check the CAMI and SAMI file and the procedures used to implement them. To accomplish this pick out random CAMIs, take them to the shop concerned and satisfy yourself that the recurring-type work inspections are in fact being accomplished at the prescribed interval.

You should regularly inspect squadron shops, area, and aircraft as a part of your program to eliminate accident potential.

In surveying the operations area, monitor training carefully on a continuing basis. Follow the progress of each pilot both by checking the training jackets and by informal discussions of performance with the other squadron aviators. You should try to become aware of and correct any squadron policy that might permit a pilot to make a flight where his

capability might be exceeded. In this regard cross-country policy, crew rest policy, maintenance test flight policy, . . . should be checked on a continuing basis.

One of the best means available to the ASO in finding and eliminating accident potential is the enlisted aviation safety council. A suggested composition of this council is the senior man in each shop plus quality control, material, and workload scheduling. As previously pointed out, this group can and will put the spotlight on problem areas if given the opportunity. Publish the minutes of each meeting along with the ASO action taken on each item discussed.

Eliminating accident potential in your own squadron should present no problem. However, the scope of your program should go beyond your own outfit. Encourage all hands to be alert for hazardous conditions or practices that could cause aircraft accidents anywhere and prepare yourself to investigate and eliminate the potential. Have you been successful as an ASO in "selling the program" to your unit? If so, share your ideas and techniques with the fleet through the medium of APPROACH or other Safety Center publications. When you find accident potential that affects more than your own unit, initiate an accident report or work with the maintenance department in submitting an Urgent or Flight Safety AmpFUR.

Preparation for Accidents

Regardless of how effective your safety program is, there is an ever present possibility of the unthinkable happening. As the ASO you should consider the worst possible type of mishap and make your plans accordingly so that anything less will give you no problem.

In preparing for an accident a good starting point is to review the squadron pre-accident plan. It should be detailed enough to adequately cover the duties of the various officers concerned in the event of a mishap. It should also contain a list of the reports required plus any miscellaneous information that might be needed in the early stages of the investigation.

You should thoroughly brief all squadron duty officer watch standers on their duties in the event of a mishap. They must be aware of what constitutes an accident, incident, and ground accident and what action is required in the event of each. They should also be briefed on damage and injury classifications, message reports, and the telephone report.

The SDOs will, of course, forget everything you have so painstakingly briefed them on so an SDO Aircraft Accident Folder should be maintained in the duty office that contains sufficient information for them to struggle through the first few hours following an accident. This accident folder should contain a copy of the squadron pre-accident plan, copy of OpNav Instruction 3750.6 and names and phone numbers of persons to be called. Also include detailed instructions for the preparation and submission of the preliminary and supplementary message reports. (A sample message format should be included that shows all action and information addressees). A copy of the telephone report blank and detailed instructions for its submission should also be in the folder. This information folder should be maintained in a current status by the ASO.

Another must in preparing for the worst is the *training of the accident board.* Impress upon them that the only reason for investigation is to eliminate future accidents and that it is imperative that you leave no stone unturned, letting the chips fall where they may. Decide beforehand exactly what duty each member will have at the scene of the accident. You might consider assigning one member the job of interviewing witnesses, another the preparation of the wreckage diagram, still another the supervision of photography, and so forth. Any plan will have to be altered somewhat to fit the circumstances but if your accident board has a basic understanding of what is required, you can eliminate most of the utter confusion that characterizes the beginnings of many aircraft accident investigations.

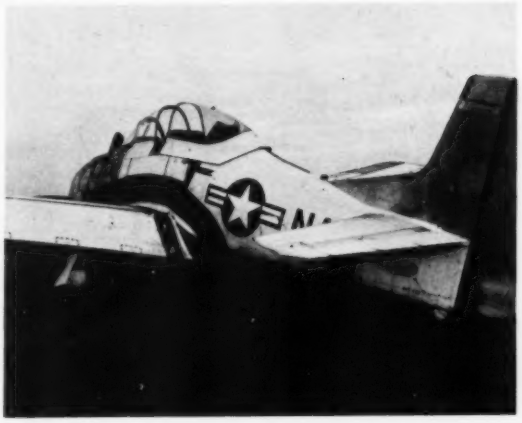
After you have made these elaborate preparations for an accident, roll up your shirt sleeves and do everything in your power to keep from ever having to put them into effect.

There will be times when you think you can't win. If you don't have accidents you will have some people half jokingly suggest that you don't need a safety officer. However, if you are unfortunate enough to "bend" an aircraft, the same people may say that if you had been on the ball it wouldn't have happened. In spite of this somewhat untenable position, take comfort in the fact that you are in a position to contribute more to the squadron's readiness than any other person in the squadron with exception of the commanding officer.

Of great benefit is the 10-week Aviation Safety Officer School at the University of Southern California. You should definitely try to attend the USC School or the one-week school conducted at the Aviation Safety Center. Either of these schools provides valuable training not available elsewhere.—Ed.

TRUTH and CONSEQUENCES

Four-Point Landing?



Take an old tired Training Command T-28B, mix in an eager inexperienced student naval aviator, add a harder-than-usual landing and presto: they said it couldn't be done—a four-point landing.

The hop was a precision/aerobatics solo, a rather inglorious beginning for one that was to terminate so extraordinarily. After 30 minutes of flight, the student entered the landing pattern for some bounce and go practice.

His first approach was waved off due to civilian traffic on the runway.

The next approach was in the student's words "comfortable." He felt he was in good shape for the full flap landing.

The T-28 rolled out in the straightaway with 87 knots. The student reduced power and noticed a slight sink rate as he approached the runway.

Holding what he had at about 15 feet off the runway, he started his flare. The aircraft continued to sink and hit hard in a slightly nose-high attitude with the wings nearly level. Touchdown was on the main gear with no bounce.

Upon touchdown, the student heard "a cracking noise" behind him. He started to add power for takeoff and suddenly noticed that the rudders would not move. He tried to move the stick but found that it was frozen.

He immediately aborted the takeoff and braked to a stop—securing the engine with the mixture control.

The aircraft halted with no difficulty and the crash crew was on the scene immediately.

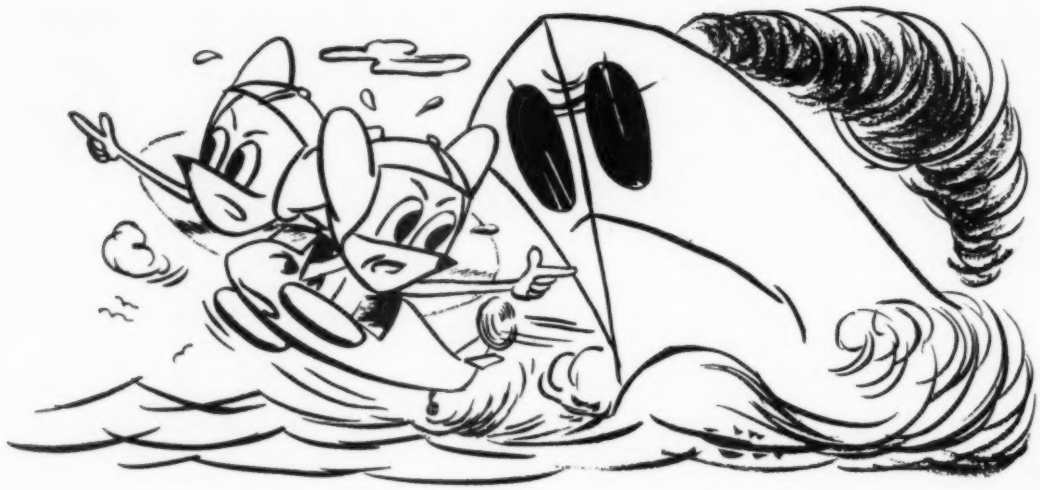
The student turned around and noticed that the tail of the aircraft was resting on the runway with the empennage split at the rear canopy. Leery of the consequences if he opened the front canopy, he exited the aircraft through the hole over the rear cockpit.

The aircraft received Alfa damage due to excessive force imposed by a hard landing. The upper portion of the fuselage split on both sides in an elongated "S" pattern from the top of the fuselage, just aft of the rear pilot's seat, to the bottom of the fuselage; thus creating a hinge—allowing the tail to drop to the deck. Rudder control cables were snapped, canopy actuating cables were broken, aileron bellcranks were jammed, several cockpit pulleys were broken, and the canopy rails were bowed.

The primary cause of the accident is considered to be a poor landing technique. The high G-forces resulting from the hard landing, probably exceeding a momentary force over 14 Gs, combined with an off-center right to left impact force which simply tore the aircraft in half.

In his anticlimactic statement, the student pilot said, "I think this accident could have been prevented by a smoother landing."

Luck rarely prevents an accident: Professionalism often does.



Same Navy, But...

We were on a local overwater SAR mission in a UH-2A, looking for survivors and debris at a recent crash scene. It was a warm clear day. A gentle 10-knot wind was blowing.

An object was spotted in the water and I established a low hover into the wind while my crewman attempted to grapple it.

A short time later, my crewman suddenly yellod "Look out!" Turning to look behind me, I saw a destroyer about 100 feet astern heading directly toward the tail of our aircraft.

I immediately dipped the nose and got out of there as quickly as the aircraft would accelerate.

Luckily the crewmen had their gunners belts hooked and were not thrown out of the aircraft.

This encounter was not unique. It has happened in similar fashion to other helo drivers. In our case, it could have been fatal had not my crewman been alert.

The irony of the thing is that this destroyer had a direct communication link with the on-scene commander and also with another destroyer that had UHF contact with us. We could have been notified of his intentions through these communication links or else he could have maneuvered to avoid us. At the time we began our hover, this destroyer was over ½ mile away.

When a helo is hovering, its heading is usually within 30 degrees of the wind line. During this maneuver, a helo pilot should not have to be concerned with the possibility of a ship ramming the rear of his aircraft, especially on a CAVU day.

If for some reason, the destroyer couldn't have maneuvered, a call on UHF guard would have at least given us some warning to clear the area.

We nearly lost a helo and crew that day. In addition, the destroyer could have been damaged and some of its crewmembers injured or killed.

Stoof Spoof

We estimated that the time required to take our passenger to his destination would use about half of our estimated 4+45 hours enroute. Since the weather was good, we decided to save a little time by making a quick passenger drop rather than

ANYMOUSE

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

shutdown, refuel and refile.

The passenger run actually took 2+25 but we still estimated that by using reasonable power settings, we would arrive back at home base with 400-500 pounds in the tanks.

Not so! Progress on the return leg was slower than we expected because the headwinds encountered were higher than forecast. We decided to press on anyway, estimating a fuel reserve of about 300 pounds at home base. This estimated fuel reserve, while lower than originally planned still looked okay to us.

The flight home was routine and we hit the break with 270 pounds indicated. The tower let us break inside a P-3 on a long, wide approach and we landed uneventfully.

While rolling out, we secured the fuel boost pumps. Simultaneously, the left engine quit from fuel starvation. At this time, our fuel gage indicated 150 pounds in the left tank and 120 pounds in the right tank. The right engine continued to run.

The left engine was restarted on crossfeed and we taxied back to the line. At refueling the plane captain determined that a total of only 16 gallons of fuel remained in the tanks at shutdown.

I'll never trust a fuel gage to get me home again. We overflew at least three fields on the way home, any one of which would have been suitable for refueling.

Close Call

The UH-34D was to dunk a wave-measuring device off the coast, hover for 29 minutes, then retrieve it. Aboard the helo was a photographer assigned to photograph an A-4E on a low pass at 300 knots past the helo.

There had been no crew briefing concerning the reason for the low pass or the photographs other than that the A-4 was to use an assigned UHF frequency. Instead of contacting the helo on the assigned frequency, the A-4 pilot made all his calls on a busy NAS tower frequency.

"Commencing low pass on the 179 degrees radial at 6 miles from south to north," announced the pilot over the tower frequency.

As the jet started the pass the weather was marginal VFR in rain.

The helo immediately turned to a southerly heading and the A-4 appeared diving through the rain-darkened horizon *directly at the helo.*

Both helo pilots grabbed the controls and attempt to turn away from the approaching jet. Each tried to turn the chopper in an opposite direction.

The A-4 pilot saw the helo and banked sharply to his right—turning into the chopper, and then hard left, missing the helo by about 25 to 50 feet at the same altitude.

Moral: This close call could have been prevented had . . .

(1) All pilots concerned been properly briefed.

(2) The mission cancelled due to marginal weather.

(3) The helo pilots agreed on each other's functions prior to the flight.

(4) All or any of the above occurred.

Plug-In Problem

BEING a flight instructor in an instrument training squadron and making lots of cross-countries, I've observed a malpractice that seems to be universal at most military fields. It's one of the linemen plugging in the APU before the pilot gives them the *Plug-In-Signal.*

Just the other day when the pilot of a *Beech* was cranking up flaps, but had not yet put the handle to OFF, the lineman plugged in without a signal to do so. Result—one hell of a flailing by the FLAP/GEAR crank. If this practice isn't knocked off, somebody, someday is going to plug in while the gear handle is UP—then the jig will be up, maybe.

▶ *The day a plug-in occurs with gear handle UP has arrived—not only once, but several times. Yet the lesson seems to be unlearned. Perhaps this report will remind the present generation of linemen to cease and desist the practice before we lose the few forgiving birds we have left. Meanwhile, operators should blow the whistle when the malpractice occurs.—Headmouse*

Peanuts Cause Fires

Two aviators, second lieutenant types back to back, can be a pat hand for hairy experiences. The experience in questions occurred during a cross-country following a RON.

Preparing for a cross-country can be a boring task, especially when two hops have been flown that day and we are now in a hurry to get to the town of our choice to further increase combat readiness. The departure was delayed by the weather man who wanted to talk and who insisted on listing something in every little insignificant box in the weather section of the flight plan.

At the destination, we broke out at a lower ceiling than expected and we couldn't figure where the rain came from, however, the landings were uneventful.

The next morning prior to departure, my wingman purchased some small bags of Spanish peanuts for an inflight lunch. He offered me some but I turned him down, commenting that I eat peanuts only while drinking beer.

About 30 minutes after level-off at cruising altitude I noticed my wingman commencing a spiral dive to the right. I repeatedly called instructions to "bring your right wing up" and after what seemed like years and a loss of about 5000 feet, he recovered.

It sounds incredible but the cause was a Spanish peanut. The wingman had turned off his oxygen, released one side of the retention fittings for his oxygen mask and relaxed to enjoy the scenery and lunch. In the process of eating he dropped one of the peanuts into the mask and the mixture ignited.

Maybe it isn't supposed to happen but it proved to me that oxygen and debris don't go together —keep the mask clean.

No Waveoff

I should have stayed in bed. Surface temperature was just above freezing, base of the stratus was barely above GCA minimums, tops over 20,000 feet, and I had the mail run from Iwakuni to Atsugi and back.

The trip to Atsugi was all right. Coming back the C-119 was loaded with 10,000 pounds of mail, 12 passengers and a General with his Aide. As the C-119 is not the best aircraft for a General, he was given the navigator's seat which is just behind the copilot.

My copilot on this leg was an experienced transport pilot so I allowed him to make the takeoff from the left seat. After takeoff an instrument departure was made. While climbing to 10,000 feet we entered heavy icing. The C-119 has eight heaters which would adequately heat the interior and also furnish enough heat to keep the leading edge of the wings clear of ice. The props had electrical heating units in the leading edges so they would stay clear of ice.

Enroute, the props, wings and tail were clear of ice but I allowed 6 to 10 inches to build on the windscreen. I had just said to my copilot, "We will switch seats now before we get to the next reporting point," when the most terrifying noise I have ever heard put the period on the statement. The aircraft yawed to the left, I started reacting; mixtures to RICH, instruments carefully scanned.

Then came the realization; loss of power in the left engine. I brought the throttle back and put the props up. The carburetor heat was steady at 25°C, well above the icing range, but my first thought was that I had let the left engine ice up. Full carb heat was applied and I advanced the throttle on the left engine ever so carefully. The total time for the sequence was about 5 seconds.

My copilot turned, looked out the window along with the crew chief and turned back yelling, "Feather it!" All my training had been never to feather until all else fails, but my hand reacted and hit the left feather button.

I picked up the mike and passed a "mayday" to Tokyo Center, adding that we were losing altitude. I had flown this route many times and knew where the closest field was located, so we headed straight for Itami, Japan. I also knew that in any other direction the mountains were higher than the capability of the now single-engine C-119.

My copilot said he had seen a stream of oil approximately 3 inches in diameter pouring out the bottom of the engine. This was his reason for yelling "feather it." And, a very sound reason at that.

We now checked our position and circumstances. The engine had frozen due to oil starvation and the prop blades were not completely feathered. This produced more drag than fully feathered, meaning we would have even a lower single-engine ceiling, and also that we would need more power for our approach.

Construction was in progress at Itami and only 3500 feet of runway was available. Tokyo gave us the weather which was above minimums for Itami and then passed us over to Itami approach control. They had us in radar contract and we were cleared for a GCA on that frequency.

A transmission about weather followed and it was obvious that the weather had deteriorated: ceiling 100 feet obscured, visibility ¼ mile with snow and fog, occasionally ⅛ mile. My poor, overworked adrenalin glands pumped some more as I ordered all passen-

gers into parachutes. The big decision had now come; should I have the passengers bail out, or could I make a safe landing knowing about the poor conditions in regards to the runway, weather, plus our aircraft condition. With the ground temperature so low I decided that they would have a better chance of surviving in the aircraft.

"Okay, GCA, I cannot accept turns over 5 degrees to the left. I require a straight-in approach and cannot accept a waveoff at anytime. Please have fire equipment standing by."

The copilot was carefully briefed: "Once on the ground, full reverse will be applied." I explained to the General that, "full reverse can be controlled with one engine until we reach 50 knots." Now to pour heat to the windscreen to clear it of ice.

Approaching the glide path everything is moving along at a good, even clip. Then glide path and we start down, and down. . . On glide path, on centerline. A perfect approach so far.

At 300 feet still in cloud. At 200 feet just snow clouds, at 150 feet keep her coming down. We are going to hit the ground and I just hope it is on the runway.

The copilot (in the left seat) is on instruments and I am straining to see something visual. We are well below minimums when it is possible to say "I have it!" I am able to make a good landing and we go into reverse. Finally, there is a smooth stop right at the end of the 3500 feet of usable runway.

Postflight examination showed that the number 2 master rod had failed. Engine time from failure to feather; about 8 to 10 seconds.

While waiting for a plane to come and pick us up we went into town. Guess who bought the beer for everyone? You are right—I did! Considering the circumstances I was happy to be in a position to spend money.

Defensive Flying

Early one afternoon I took off in an F-8 to deliver it to a base about 400 miles away. The runway length at my destination was relatively short for an F-8 but I had an alternate close by with enough runway length to keep me out of trouble. The weather was marginal VFR and though subject to deterioration to IFR in fog and haze no below minimum stuff was likely.

At the destination I was picked up by approach control and descended to 2000 feet while still southwest of the field. At this time I began to dump fuel to arrive at landing weight. However, on a hunch I decided to keep a little fuel in excess of landing weight until my final approach.

The winds had been given to me as southeast at 6 to 8 knots and I expected an approach to runway 10. During the radar vectoring I realized that I was being set up for the reciprocal, runway 28. Thereupon I advised approach control that I could not accept that runway with its tailwind component.

During this time I was informed that the tower's radios were inoperative and that the jet barrier was not rigged on runway 10 and I should expect a 15-minute delay. I thought myself wise to have saved fuel and informed radar that I could wait for the barrier. However, they said to climb to 3500 feet clear of traffic and stand by. I was kept informed of the situation but upon reaching 1500 pounds of fuel I elected to go to my long runway alternate.

The subsequent handoff and GCA (the area had quietly gone IFR) were routine but I am convinced that when you fail to plan for the little things that can go wrong you may have big trouble.

Mouse Retires

The originator of Anymouse, Commander Trygve A. Holl, USN, recently retired after 23 years Naval Service.

Anymouse was developed by CDR Holl in 1950 when he was aviation safety officer of VR-31 (now VRF-31). Several years later this unique system of reporting hairy tales or hazardous situations was adopted by the Naval Aviation Safety Center. His Mouse has been a permanent resident of APPROACH ever since.

Reader Questions Headmouse Answers

Have you a question? Send it to Headmouse, U. S. Naval Aviation Safety Center, Norfolk, Virginia 23511. He'll do his best to get you and other readers the answer.

Fuselage Dye Marker

Dear Headmouse:

I was just perusing some old APPROACH magazines when I came across a letter that caught my eye. It appeared in the October, 1957 issue, and it concerned attaching dye marker within the fuselage to enable searchers to locate the wreckage when it is underwater. Your reply was that this was being passed to BuAer. What was decided on this suggestion?

The reason I am so curious is that I have been on three AABs in the past 11 months and on two of the investigations, location of the wreckage was a major problem. I just finished my last AAB four days ago and if we had been able to locate the wreckage in a reasonable length of time, it might eventually have been returned to service.

Something should be done to facilitate location of underwater wreckage, and unless there is a better device under development, I think the dye marker suggestion has some merit. Can you bring me up to date on what is being done to help find underwater wreckage?

JAMES A. KREHMEYER, LT
SH-3A EVALUATOR, HS-10

▶ BuWeps letter serial RAAE-233/62:EBA of 30 January 1963 stated a new dye compound had been developed at NAEL which provided a marking capability of 27 hours under open-sea conditions, and recommended that the priority assigned this project be raised to allow complete specifications in 1963.

BuWeps report RAAE 22 at the contractor's conference in January 1964 reported that automatic operations were being incorporated in the crash marker dye systems for aircraft installation (permanent installation of marker dye in naval aircraft to assist in search operations for aircraft missing over water). As the crash marker, in a cylindrical metal unit, sinks with the aircraft, water pressure opens a hydrostatic pressure relief valve allowing water to enter a port in the interior of the marker unit. Entering water activates a sea water battery which triggers an explosive actuated valve releasing high pressure gas (3000 psi nitrogen) from a hermetically sealed cylinder. This gas forces a piston containing the dye material from the unit and the piston which is buoyant floats to the surface and emits the dye. A 500-foot line connects the floating piston to the downed aircraft for shallow water recovery operations if depths permit.

An appropriation for a prototype installation and testing under the direction of Aerospace Crew Equipment Laboratory has been made. ACEL indicates that the unit, not including mounting brackets, etc., is 10″ long, 6″ in diameter, and weighs 10 pounds. An improved dye marker which lasts for 48 hours has now been developed. Sea trials of the improved dye are scheduled for May-June 1965.

Very resp'y,

Engine Fire Signal

Dear Headmouse:

After several days of searching through various ground handling and safety publications, I have come to the conclusion that, unless I have overlooked it, there is no officially recognized signal for use by the ground crew to signal the pilot, during engine start, that a fire has developed in the engine area.

After further investigation among pilots and crewmen, it was determined that no one recalled having previously seen a designated signal for this situation.

Any information or reference material you may be able to furnish concerning this situation will be greatly appreciated.

F. H. WOOD, LT
SAFETY OFFICER, VP-17

Dear Headmouse:

Is there any standard signal for a stack (torching) or engine fire? If there is, we would like to know what it is. If not, please answer one way or another.

NAS LINE DIVISION
MOFFETT FIELD

▶ Strange as it may seem, there is no standard signal for engine fires *per se*. After considerable research, including review of mishap reports, interviews with pilots, ground crewmen, line chiefs, both young and old, the question arises —is there a need for such a signal? It seems the question can be answered partly by referring to the following:

a. OpNav 34P1 U. S. Navy Safety Precautions (currently being revised for ship and shore operations), Para 03203 Ground Hazards of Aircraft Engines, sub-

para 5, Fire Guard: "Prior to the starting of an airplane engine a qualified fire guard shall be stationed strategically near the airplane, to the rear and side of the engine being started. The fire guard will be equipped with approved fire extinguisher equipment and will be prepared for its immediate use. The fire guard will stand by in readiness until all engines are operating and the danger of fire no longer exists."

b. NWP 41(A) Naval Air Operating Procedures, Para 440, Aircraft Ground Operations, subpara (d), the S-2F Plane Captain's Handbook and other local doctrines in keeping with the foregoing, say in essence that aircraft engines will not be started except with an authorized and qualified operator at the controls and a fire watch in sight of the operator. Standard hand signals shall be used between the operator starting the engines and the fire watch. The start shall not be attempted until the fire watch signals "ALL CLEAR."

c. NWP-41 (A) Naval Air Operating Procedures, Fig. 6-1f states "ALL CLEAR" is indicated by a thumbs-up signal, fist at shoulder level, thumb pointing up. Given by pilot when he desires to start engine. If all is clear, same signal is reply. Night—extinguish one wand, sweep other to thumbs-up position.

THUMBS DOWN: Arm extended at shoulder level, fist with thumb pointing down means *something is wrong*. Night: Extinguish one wand, sweep other to thumbs-down position.

d. NWP-41(A), Para 513 Procedures for extinguishing aircraft fires vary according to the location, type of fire and aircraft involved. Fire feeding agent (gasoline, oil, hydraulic fluid, etc.) should be shut off prior to releasing the extinguisher. All squadrons must use emergency checklists and must conduct training to ensure that all personnel have full knowledge of their duties during any type of fire.

e. NWP-41(A) Helicopter Signals. Fig. 6-6. Pilot to Director: Ready to start engine—pilot moves hand in a circle perpendicular to the deck, followed by a thumbs-up signal. The copilot signals for no. 1 engine and the pilot for no. 2.

Note: Thumbs-up is also a general signal. Meaning depends on previous signals and the particular part of sequence in an operation. Also means "yes." To indicate that the signal is to be a particular person or area, make signal first in that direction.

Night: Pilot turns on flashlight or moveable light, moves it in a circle perpendicular to the deck.

Director to pilot: Ready—start engines: Director standing in full view of pilot: Thumbs-up signal with right hand, followed by rotating index finger in vertical plane at waist level, red flag held in left hand above head, green flag concealed, furled and inserted in pocket.

Night: Sweep amber wand to thumbs-up position, rotate amber wand at waist level in vertical plane, hold red wand above head until engine starts, green wand OFF and in hip pocket.

Director to pilot: Cut engine: Director holds red flag aloft, gives throat-cutting signal, indicating clear to cut at pilot's discretion.

f. In the case of jets, the F-8 Plane Captain's Handbook, NavWeps 01-45HHC-2 puts it this way: Fire in Engine: "If the fire warning light comes ON, or fire is observed in the intake duct or the tailpipe"—certain actions must be accomplished by the man in the cockpit—and these are too lengthy to be repeated here. However, the following is rather interesting. "Check that the fire guard is familiar with the quick opening ports."—Now they tell me!—"In addition to the nose intake duct and tailpipe opening, various quick opening ports may be used as access through which fire-fighting materials may be applied.

In summary, the fire guard's actions usually signal the pilot that something is wrong. The action can vary from directing a cut, directing continued turn-up or applying fire-extinguishing materials. These actions, coupled with the discretions allowed the pilot and the actions taken by the pilot, which are usually those dictated by the Flight Manual for the particular model aircraft, govern the emergency procedure communication. A "standard" signal for a non-standard situation may defeat its purpose.

Very resp'y,

Headmouse

Re Anticollision Light

Dear Headmouse:

What set of rules or instructions determines the mandatory use of anticollision lights on military aircraft in IFR and VFR conditions?

J. A. JOFFRE, AE1
NAS, DALLAS

▶ OpNavInst P3710.7B of 10 February 1964 states on page 5-8, paragraph 549b that "*When installed*, the anticollision light will be used from takeoff until landing during *all* flights. The anticollision light may be turned OFF during flight through clouds when the rotating light reflects into the cockpit." However, paragraph 549d points out that formation flights are exempt from the requirements of paragraph 549b.

Very resp'y,

Headmouse

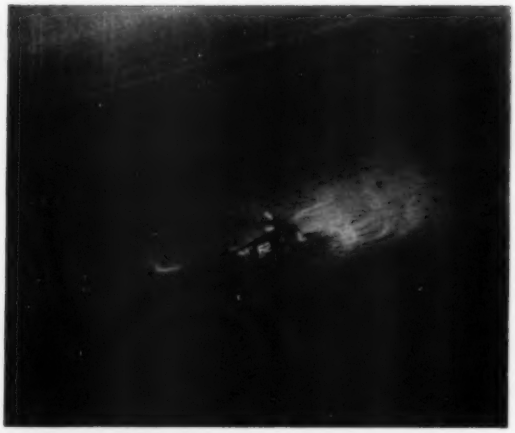
CRUSADER EJECTION!

Photographs of an actual e c
ejection were taken by anothe
The overland ejection was no n
worked as advertised□ Lar in
the story and unusual chain f
at Black Rock," page 8□

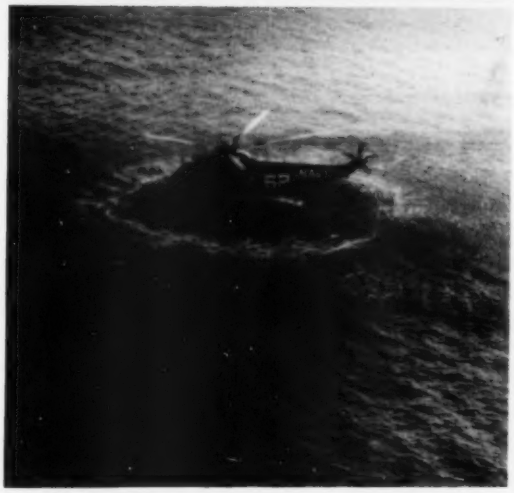
ual e ction are a rare thing indeed□ These pictures of a *Crusader*
noth RF-8A pilot who prepositioned his plane in order to do so□
s no nal: altitude, 7000 feet; airspeed, 175 knots□ The system
Lar ing and helicopter rescue were uneventful to a point□ For
ain f events surrounding this *Crusader* accident, see "Bad Day

THE WET WAY

By LT. D.L. Green



Operate the good engine at maximum power available with the manual throttle.



When the rotor RPM reaches 117 percent effect a takeoff.

Trade RPM for initial lift and transition to forward flight.

High on the list of "Will it or won't it" in the minds of many SH-3A pilots may be the question of single-engine water takeoff. For those of us that have been unlucky enough to put one of these wind machines down in the open sea, a satisfactory answer to this question is of special interest.

Recently one of our birds (HS-2) had an engine failure while in a hover and subsequently made a open-sea forced landing.

Using a procedure developed within his squadron, the pilot executed a successful single-engine takeoff after three or four minutes on the water and flew his aircraft (with all associated equipment aboard) back to a nearby field. His gross weight at liftoff was about 18,500 pounds.

As some sage character once said; "The proof

Estimated and Actual Flight Data

Point	Nr/Nf	Q	Ng	T5	IAS	Alt	
A	110%	85%	99½%	677°C	0	0	The engine is stabilized at normal topping and rotor RPM is being controlled by collective position.
A′	117%	80%	103%	730°C	0	0	When ready for takeoff the engine is advanced to Max power available. RPM is controlled by collective pitch.
B	105%	100%	103%	730°C	3	8′	Collective pitch is increased in a positive movement to give 100-105% Q and a near constant rotor decay rate.
C	89-95%	90-100%	103%	730°C	10-15	8′	The rotor RPM is stabilized by adjusting collective pitch to reduce power demanded.
D	89-95%	90-100%	99½%	677°C	25-35	10′	Power can be reduced to normal rate at this point. If rotor decay or settling occurs the manual throttle can be safely advanced to emergency power once again.
E	Minimum of 40 knots until transition to 70 knot single engine climb.						

The above figures are predicted results of an emergency single-engine water egress, using the proposed flight procedure. The prediction is based upon actual flight data using vertical takeoffs from a hard surface. Limitations set forth in the pilots' flight manual were never exceeded. Observations were made at different power settings and rotor RPM to predict the advantage which could be attained at the higher settings suggested.

is in the doing" and the proof in this case is the presence of a one-and-a-half-million-dollar bird sitting out on the squadron line instead of visiting our finny friends in the deep blue.

This new procedure is the brainchild of a pilot of this command. After much study, thought and digging through the manuals, he devised what has proven to be a highly successful method of single-engine water egress.

The basic mechanics involved are to operate the good engine at maximum power available with the *manual throttle,* build the rotor RPM to 117 percent and effect a takeoff, trading RPM for initial lift and transition to forward flight.

Depending on aircraft weight and pilot technique the rotor RPM may drop to as low as 89 percent during a successful takeoff. The entire evolution is very similar to a jump takeoff in a light reciprocating helo. (See accompanying diagram for specifics.)

The big advantage in using this procedure is that the engine can be made to produce maximum power at much higher rotor RPM (117 percent vice 105-7 percent), thus providing that much more additional initial lift at takeoff. Also, the engine at maximum power greatly reduces the rate of rotor RPM decay, thus giving the pilot extra time to gain forward speed and the necessary translational lift. At this time the power available will be equal to or exceed the power required and a successful water takeoff becomes a reality.

During this entire procedure the airframes and engine components are operating within safe limits. Since there are no pucker factors such as overtorque, overspeed or overstress involved, the pilot may proceed to an emergency landing site with a reasonable assurance of aircraft reliability during the flight.

Perhaps the most significant advantage of this procedure is that it is applicable to single-engine takeoffs in high sea state conditions.

For Information the Results of a Typical Flight are as Follows:

OAT:	23°C	Gross Weight:	16,200
DA	+1450 ft	Crew:	4
Wind:	0-5 var.	Power available on one engine used at 100% nr:	95%Q

Power required to hover on two engines at 10 ft: 62%Q

Equivalent power on one: 124%Q

At Takeoff:
Nr/Nf-111% Q85% Ng 99½% T5-677°C

Takeoff was effected with constant 100-105% Q which was reduced to 95% Q when Nr decayed to 90%. Evolution from A' to D should not exceed 15 sec.

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FLYING AREAS/By W. Thomas Deason, FAA Liaison, NASC

The day has long passed when a pilot could blast off into the blue to fly about unhindered by restrictions of any kind.

Today pilots contend with regulations and directives pertaining to almost every phase of flight from takeoff to landing. There are areas where he may or may not do thus and so, and other areas where he must not trespass lest his knuckles be rapped with a flight violation.

Now nobody wants a flight violation. Besides the possibility of bringing down wrath from above, it's just not considered the professional thing to do. Therefore it seems logical to occasionally review the regs to refresh our understanding of the airspace that is set aside for limited use only.

Prohibited Areas—an easy one for a starter, and you guessed it—don't fly through these places unless you've got special permission. These areas are designated by an Executive Order which is based on the Administrative Procedure Act. The Prohibited Areas are depicted on the nav charts.

Restricted Areas and Restricted Areas/ Military Climb Corridors—these are a bit more flexible. You can fly through these areas as long as you obey the rules. For example, flying through a Restricted Area during periods when published notices say it is in use is taboo unless you first obtain permission from the controlling authority. At all other times you're welcome to use the airspace. These areas were set up by a rule based on the Administrative Procedure Act. They are found, also, on the nav charts.

Controlled Firing Areas—an area in which air activities are monitored so as to eliminate hazards to nonparticipating aircraft/persons and property on the surface. Controlled Firing Areas are publicized locally and are *not* shown on nav charts. They are established by the FAA Regional Air Traffic Division.

Flight Test Areas provide airspace for the following purposes:

- To investigate or check the operational capabilities of a new type aircraft or propeller that has not been determined airworthy by appropriate military or civil authority.
- To test fly a production aircraft to determine the basic airworthiness of its airframe, engine or propeller.
- To test fly an aircraft following major alteration to its airframe, engine or propeller before the basic airworthiness of the altered components has been determined by the pilot.

These areas are established by the FAA Regional Air Traffic Division in two categories, the first for a period of 60 days or less, and the second for periods lasting up to a maximum of two years. They are publicized on a local area basis and are *not* depicted on the nav charts.

Special Operating Areas lie within positive control airspace. They are designed to handle peculiar local flying activities that require special handling because they do not integrate well with other types of traffic. These areas are established through the coordinated efforts of the local ARTCC and the intended users. They are publicized locally and are *not* depicted on nav charts.

Intensive Student Jet Training Areas provide a defined air space for a large number of daily sorties. During these flights numerous non-hazardous maneuvers are performed. Air traffic control under these circumstances would be largely impractical and a great hindrance to continuity of flight training activity. Intensive Student Jet Training Areas are depicted on nav charts and are established by the FAA Regional Air Traffic Division.

Warning Areas are located outside the continental United States over international waters. Activities constituting a potential danger to aircraft may exist in these areas. It's okay to fly through Warning Areas at any time but penetration during periods of published activity may be extremely hazardous and is definitely not recommended. You can find the Warning Areas on navigation charts. These areas are established by agreement between the Department of Defense and FAA.

Caution Areas contain visible hazards to flight or navigation, such as unusual aircraft maneuvers, high density traffic or parachute drops. You can fly through these areas at any time but extreme vigilance is recommended. Usually the activities in these areas are of such nature that ample time is available to take diversionary or evasive action.

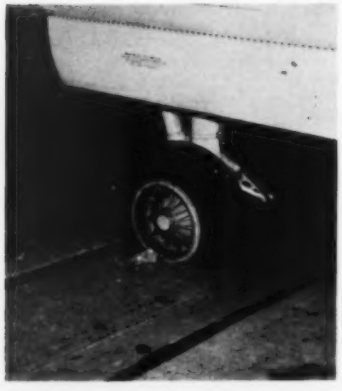
These are briefly the eight general types of limited use airspaces.

Editor's Note: This information is also available in outline form for use in operations offices, or instrument school refresher courses. Write APPROACH *direct.*

Short Snorts

The prevention of aircraft incidents and ground accidents should receive the same strenuous efforts as the prevention of flight accidents. . .

Breakthrough



Where hundreds of S-2s traversed safely before, the S-2E could not—weighing more than a ton more. Hangar door drainage lip failure.

Hot GTC

The line safety observer was concerned about the possibility of heat damage to his asphalt ramp, so he had the F-4B plane captain move the GTCP-100-3 starting unit onto a concrete pad —into a position directly beneath the aircraft's partially folded port wing. In this location the unit's exhaust gases impinged against the wing undersurface.

Shortly after the engines were started, the pilot raised his wings to the folded position. Then the line CPO arrived and made a "feel" test on the affected area. The skin was barely warm and the paint was not blistered or scorched, just discolored by smoke. He gave the pilot a "thumbs up."

After the flight, an area of skin on the underside of the port wing was found to be separated from the honeycomb.

Personnel error was assigned as the cause. It was suggested that the plane captain should have taken his problem to his line CPO when caught between orders of a safety observer and standard operating procedures.

MARTD Instrument Hood

The Marine Air Reserve Training Detachment, Norfolk, has come up with a design for an instrument hood easily fabricated by squadron parachute riggers from stock items and adaptable to any aircraft cockpit.

Basically, the instrument hood is a shield of heavy duty aluminum wrap covered with cotton duck material. A strip of hook tape (Velcro) on the hood grips two strips of pile tape glued on the helmet and holds the hood securely in place until the wearer removes it. Designers of the hood are Marine Captains Don Kirby and Laurin De Wolf. Staff Sergeant Donald Kinney worked out the manufacturing techniques.

The MARTD instrument hood meets all the requirements for such a piece of gear:

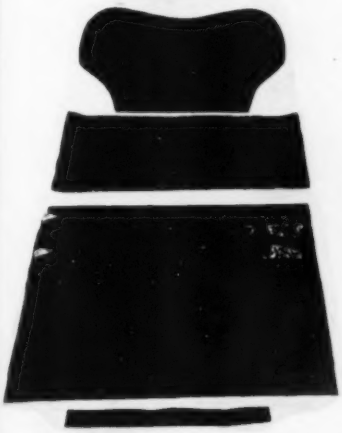
- Lightweight and flexible—every pilot can carry one on every flight without encumbering other flight gear.
- Adaptable to present equipment without modification to aircraft instrument panel.
- Adaptable to helmet.
- Easy to attach and remove with one hand.
- Easily manufactured locally, in approximately 1½ hours and from present stock in the supply system.

MARTD feels its design is optimum for any aircraft. Their hood is fabricated to fit the glare shield and cockpit of the A-4, but the design can be adapted to other cockpits by simply changing the length of the hood. MARTD pilots

do not believe the hood presents any problem in the event ejection is necessary; the pilot could easily and quickly remove the hood before pulling the face curtain.

Here are materials and manufacturing instructions for the hood:

1. R8305-514-5134-L980. Cloth: cotton twill., 2 ea., 9″ x 18″.



2. Heavy duty aluminum wrap or super strength wrap. 18″ wide, 4 ea., 9″ x 18″. (This item is not in stock. MARTD prefers it to the aluminum foil in the supply system. The latter can be used but is not as versatile for this particular purpose.)

3. D8305-256-3902. Cloth: cotton duck. 1 ea., 9″ x 18″.

4. D8315-176-8083. Tape nylon ¾″. 1 ea., 43″ approximately.

5. D3040-270-3150. Cement. One tube, enough for 18 to 20 helmets.

6. RS 5325-792-9226-L980. Hook tape (Velcro). Comes in one-foot strip, 1″ wide. Use approximately 10″ per hood.

7. RS 5325-795-1087-L980. Pile tape (Velcro). Comes in one-foot strip, 1″ wide. Use 2 ea., 4″ x ½″ piece. Can complete three helmets per one-foot strip.

8. 8310-262-2772 Thread Size E.

The "layer order" for the hood is 1 2 2 3 2 2 1 (see numbered materials above). Cut each piece 9″ x 18″. Sew together on one edge. Trace the pattern, sew the quilting, then trim to size and bind with nylon tape.

As of this writing, MARTD has been using this hood for one year. Pilot response to it has been favorable.

Hiding Place

Immediately after being launched, the A-4E pilot reported that he had an unsafe gear indication and was streaming fuel. He landed aboard without further incident.

Investigation revealed that a 2½-inch hole had been torn in the under side of the starboard wing (directly above the starboard main landing gear strut) by a hurricane tiedown wrench that had been left in the starboard wheel well the night before. When the gear was raised, this wrench was forced upward, puncturing the skin.

What happened was that a plane captain had secured the aircraft the night before with the expectation of preflighting it the following morning. In order to assure himself of having a hurricane tiedown wrench available for the morning preflight, he had hidden one in the wheel well.

Unfortunately, a different plane captain was assigned to the *Skyhawk* for the 0500 preflight. Neither he nor the pilot found the hidden wrench in the starboard wheel well.

Ready availability of hurricane tiedown wrenches has been a continuing problem, since they are very susceptible to becoming lost or strayed. Instructions to the line crew have been modified so that the wrenches will be issued to plane captains only when necessary, and turned in immediately after use.

This incident served as a concrete, close-to-home example to the line crew illustrating how they share the tremendous responsibility for flight safety with pilots. It also reminded pilots once again that they cannot be satisfied with anything less than a meticulous preflight inspection, no matter how difficult it may be.

CROSSED SIGNALS

I realized he had misinterpreted my thumbs-up signal

DURING a maintenance-requested airstart of the port engine of an F-4B, an electrical failure occurred. The RIO, pre-briefed on the reason for the check and the techniques to be used, was immediately aware of the electrical failure though he did not know its extent or whether additional emergencies were in progress. He saw that all circuit breakers were in. He then looked for a visual signal from the pilot.

At this point, the pilot made a thumbs up signal with his left hand to assure the RIO that the situation was under control. Through the narrow opening between the two cockpits, it appeared to the RIO that the pilot's thumbs-up fist was striking the canopy. The RIO interpreted this as a visual signal for ejection although there was some uncertainty in his mind. To make sure, he returned the signal against the rear canopy. Seeing this, the pilot believed the RIO understood that the situation was under control and acknowledged with an affirmative nod of his head and another thumbs-up signal.

The next thing the pilot saw was the RIO position himself, pull the face curtain and eject.

"It was in this terrible instant," the pilot stated later, "that I realized he had misinterpreted my thumbs-up signal for the pounding of the canopy with clenched fist described in the NATOPS manual for an emergency visual eject signal."

Seat separation, parachute deployment and descent were uneventful. The RIO inflated his Mk-3C life preserver during descent, released his parachute on water contact and swam to his raft. He was sighted by the crew of a C-54 and was picked up by helicopter. His only injuries were minor contusions. The pilot did not see the RIO's chute. After making a quick search, acutely aware of his radio failure and the urgency of landing in order to

notify the SAR facilities, he returned to base.

While noting that a reliable method of emergency communications between cockpits (such as a mechanical linkage device) is desirable, investigators suggested use of a circle formed by the thumb and index fingers instead of the thumbs up for "OK." As the flight surgeon investigating the case points out, "The traditional thumbs-up signal to indicate 'All's well' can be confused with the visual ejection signal due to the limited signal space available."

Confusion

AFTER ejecting from an F-4B, an RIO released his right lap belt fitting during parachute descent. This made it difficult for him to reach the survival kit release handle to deploy the raft and survival kit.

This particular RIO had attended all recent quarterly ejection seat drills, the investigating flight surgeon reports. The squadron in question operates four models of aircraft including the F-8. To quote the flight surgeon, "It appears that the RIO, familiar with F-8 survival kit and raft deployment procedures by virtue of squadron training discussions and his reading, acted in accordance with F-8 doctrine. (*Not quite: the correct procedure for the F-8 is to release the left fitting, not the right.—Ed.*) This error further complicated his attempt to enter the raft. His usual practiced method for entering was foiled due to the dangling upper seat pan."

For downed aircrewmen with hard-pack survival kits, procedure after parachute release and water entry is as follows: (Reference BACSEB 32-62.)

- Pull raft to you by means of drop lanyard attached to survival kit upper section.
- Immediately attach raft retaining line snap-hook to either rocket jet fitting located on right or left shoulder of torso harness or to the rescue lift ring.
- Release survival kit upper section from body and enter life raft.
- Keep raft retaining line secured to you at all times until rescue is accomplished.

A generalization, beyond the limits of this particular case, can be formulated here:

Involvement with, or training in, more than one model aircraft requires constant review of emergency procedures even for a well-qualified, experienced flight crew.

Praise for Rescue

THE accident board investigating an A-3B water crash after takeoff considered the work of the rescue helo and whaleboat crews "especially commendable."

"The helo was dispatched immediately and the actions of the helo crew made a difficult rescue of a badly injured survivor come off very smoothly," the report stated. "The prompt decision to place a crewman into the water to assist the survivors was excellent. The Board feels that LT ..... could not have been rescued without assistance. The speed and dispatch with which the carrier whaleboat arrived on the scene significantly contributed to the rescue and search. The second survivor's actions in signalling that he was all right helped the helo pilot to decide which survivor needed immediate rescue. He is commended by the Board for his selfless action while badly injured himself.

"The person who most significantly contributed to the successful rescue of the two survivors was the helo crewman. His actions in the water demonstrated exceptionally good judgment and training. His deployment of his life raft as a marker and additional flotation gear is considered excellent procedure. Further, by preventing one of the survivors from igniting a day distress signal (*in the presence of fuel.—Ed.*) he avoided the possibility of a serious fire."

—From an AAR

Seconds Count

FOLLOWING inflight engine failure in an A-4E, the pilot ejected at 2000 feet above sea level, 1250 feet above ground level. In the NASC accident investigation, it was recommended that information be published regarding the hazards of delaying the ejection sequence, "especially over mountainous terrain, after it becomes obvious that the aircraft is not capable of sustaining flight and crash is imminent."

NATOPS gives ejection minimums. Altitude overhead won't help you and mountains below cut into your safety margin.

In the case above, engine failure took place at about 8300 feet.

"The terrain elevation within seven miles of the accident varies between 750 and 1785 feet," the NASC investigator states. "In view of the high sink rate present at the time of ejection, it is estimated that had the pilot delayed his ejection by as little as two or three seconds, the ejection would have been below the capability of the seat."

The accepted ideal minimum for ejection is 10,000 feet. If your troubles occur lower than 10,000 feet, *especially* over mountainous terrain, and the aircraft is not capable of sustaining flight, don't delay your ejection—get going—seconds count.

Introducing Mil-L-23699 Oil

By Harry R. Lewis, RAPP 412
Bureau of Naval Weapons

BuWeps Notice 10350 of 2 July 1964 advised all activities of the changeover of all aircraft turbine engines, reduction gear boxes, constant speed drives, helicopter transmission systems and other accessories currently using Mil-L-7808 oil to a new higher viscosity type, Mil-L-23699(Wep). Why do we need a new oil at this time? What's wrong with Mil-L-7808?

This question has been and will be raised many times by maintenance personnel. Mil-L-7808 oil was the first successful high performance turbine oil and has done a good job in the advancement of gas turbine technology. However, as in many areas of turbine design and development, higher performance capabilities demanded an improved lubricating oil. Mil-L-23699 is an increased viscosity oil with higher thermal stability, lower volatility and improved gear loading that meets these new requirements.

Development

Let's go back a little in the history of turbine oil development and find out a little more about the past.

Early aircraft turbine engines that came in being in the mid and late 1940s were lubricated with mineral oils such as Mil-0-6081, Grade 1010 and 1005. As the state-of-the-art in turbine engines advanced it soon became apparent that if we were to extend the limits of speed, range and operating ceiling, new lubricants having those characteristics suited for the more severe operating envelopes must be developed so that the full potential of the new engines could be realized.

Research was started in this period towards determining the properties that would provide such lubricating oils. It was soon learned that mineral oils would not meet these requirements. Even with the use of various additives, properties so necessary, such as film strength and low temperature fluidity were not to be had. In addition, they were lacking resistance to volatility, high temperature and thermal and oxidative stability. After many years of research both in the U. K. and in the U.S.A. it was found that certain esters of diabasic acids held promise for the desired properties.

In December 1951, the first synthetic oil specification was developed in the U.S.A. known as Mil-L-7808. Since that date, revisions have been issued updating it, within certain limits consistent with demands. As the turbine engine technology continued to advance, it soon became evident that a new oil must be developed. Problems such as plugged oil jets, carbon accumulations around contact surfaces of face seals, vapor phase coking in breather lines and fittings and clogging of scavenge strainers resulted due to the deficiencies of Mil-L-7808 oil. In

addition, gears and bearings in gearboxes were being subjected to higher fatigue loads. This was accelerated with the increased use of turboprop and turboshaft engines and helicopter transmission systems in the Navy and Marine Corps.

Specifications Set

BuWeps went out to the industry in 1962 with a development specification with requirements that would give us the necessary properties for current and advanced propulsion and power transmission systems. In brief, we wanted an oil that was capable of service at temperatures about 100°F higher than Mil-L-7808 and that satisfied other requirements such as increased viscosity, low pour point, high load carrying ability, negligible foaming, non-corrosiveness to a variety of metals and storage stability. It must also be compatible with Mil-L-7808 oil and with the various elastomers used in seals and gaskets in the various components.

Characteristics

Socony Mobil Oil Company was first to submit an oil to meet all of these requirements with their XRM-139A (Mobil Jet II), followed by Shell Oil Company with Shell Aire 505. The major physical characteristics of these Mil-L-23699 oils as compared to Mil-L-7808 are listed below:

ASTM Test Designation	Mil-L-7808E	Mil-L-23699
Viscosity @ 100°F	11 cs. min.	27 cs. min.
Viscosity @ 210°F	3 cs. min.	5 cs. min.
Viscosity @ -40°F	less than 13,000 cs.	13,000 cs.
Pour Point	-75°F	-65°F
Flash Point	400°F	475°F
Neut No.	0.3 max.	0.5 max.
Ryder-Gear Test Rating lbs/in.	1900	2600 min.
Rubber swell % (168 hr @ 158°F)	12 to 35	15 to 35 max.

What do all of these characteristics mean to the operator? Let's take a quick look at them individually.

Viscosity—The 70 percent increase with Mil-L-23699 means that we have a more stable oil film on rubbing and wearing surfaces to prevent such problems as surface fatigue and scuffing of gears. The range of temperature is somewhat less at the extreme low end but the oil is fluid enough at low temperatures to permit starting and immediate flow to those surfaces to be lubricated. It also has the capability of providing good load-carrying ability under all operating temperatures.

Pour Point—The pour point is about 10°F higher than with Mil-L-7808 and somewhat limits its extreme low temperature but is considered an acceptable trade-off because of gear loading improvement and thermal and oxidative stability. A -40° temperature for cold starting is below the level that will be encountered in Navy or Marine Corps operations.

Flash Point—The flash point increase tells us that the oil has less volatility and consequently less vapor coking in breather lines and fittings and less oil loss from volatilization. Overall thermal stability and high temperature oxidation should provide less deposits in high temperature areas and a reduction in coking and oil sludging.

Neutralization Number—The neutralization number remains relatively constant due to the stable viscosity despite oil shearing in pumps and bearings.

Ryder Gear—Higher Ryder Gear load will provide for improved scuff and fatigue resistance not previously available with Mil-L-7808 oils.

Rubber Swell—The rubber swell limits control swelling of O-rings and gaskets and in turn reduce oil leakage. The present percent max limit appears higher than desirable and may be decreased in the next revision to the specification.

There are other characteristics that provide superior service over Mil-L-7808 oil; an example is foaming. Service tests have disclosed practically no foaming. This will reduce overboard oil venting through the breathers and vents and decrease the present foam space in oil tanks now required with Mil-L-7808 oils.

The next question that might be asked is testing. How much flight time has been experienced with this new oil in engines and other components? Commercial airlines have amassed many millions of miles with outstanding results in such equipment as turbine engines, CSDs, starters, air turbine motors, air-conditioning and cabin pressurizing units. More airlines both domestic and international are adopting this oil. An 18-month Navy flight test program at the Naval Air Test Center, Patuxent River in F-8D, SH-3A and P-3A aircraft confirmed the airline results. BuWeps Instruction 10350 of 20 January 1964, cancelled by the notice of 2 July 1964, directed the conversion of C-130s, P-3As, SH-3A and UH-2 model aircraft in March 1964. Since conversion, considerable flight time has been amassed by these fleet squadrons.

Navy-wide Usage & Requirements

Since 1 January 1965, when Navy-wide conversion commenced, certain items must be observed.

The first is that more frequent oil filter checks and cleaning intervals may be necessary initially on en-

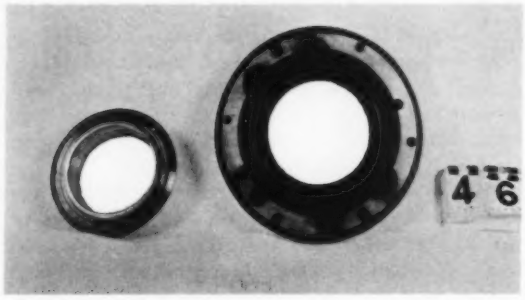


Fig. 1. Front compressor bearing carbon seal of a T56-A-7 engine that has operated on Mil-L-7808E oil for about 150 hours. Black deposit in the seal area is oxidized oil.

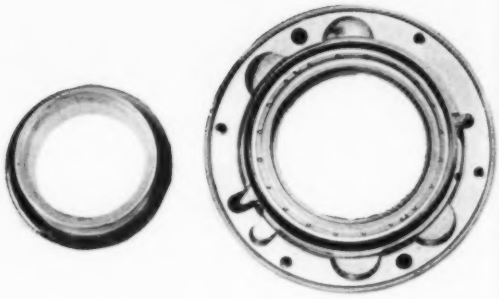


Fig. 2. This is the same part as noted in Fig. 1 with an equal amount of time on Mil-L-23699 oil. Note the lack of deposits.

Fig. 3. This is the compressor rear bearing outer race of a T56-A-7 engine with about 150 hours on Mil-L-23699 oil. Note the lack of deposits or oxidized oil film.

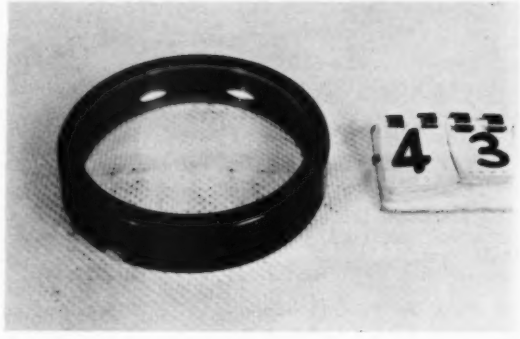


Fig. 4. This is the same outer race used in a T56-A-7 that had operated on Mil-L-7808 oil for about 150 hours. Note the lacquer film on the external load surfaces and the varnish band on the race surface.

Fig. 5. The labyrinth seal space of the rear turbine bearing has also operated for 150 hours on a T56-A-7 engine with Mil-L-23699. This part is in an extremely hot area subjected to hot bearing cavity air temperatures.

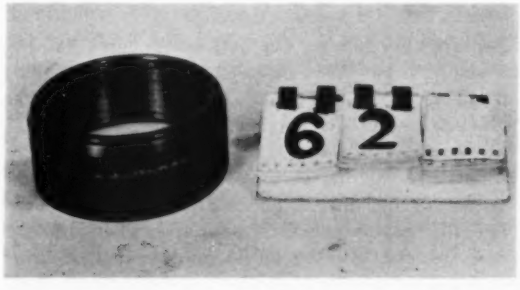


Fig. 6. This is the same part as noted in Fig. 5 that had operated for about 150 hours on Mil-L-7808E oil. Note the flaky carbon material adjacent to the seal race.

gines and major components with over 100 hours previous time on Mil-L-7808 oil. The frequency of such checks can be varied as the filter conditions dictate. On new aircraft engines and systems this may not be necessary.

On those aircraft that use air/oil coolers for CSDs or engines, flaky material may persist from the solvency of Mil-L-23699 oil on old deposits from Mil-L-7808 oil, and thus require additional filter inspections. When overhauling and cleaning oil-exposed parts, the cleaning solvents should be thoroughly removed. Otherwise, a precipitate might form from the action of the oil and these solvents and cause accelerated gum like deposits.

Oil Change Interval Testing

BuWeps is conducting an oil sampling program with a varied number and model of fleet aircraft. By this procedure, it will be possible to determine an optimum oil change interval. To date, laboratory tests have not detected any oil breakdown. Some of the engines have well over half of their TBO on the Mil-L-23699 and all data indicate that the chemical and physical properties are very stable. *At present the oil change interval shall be the TBO of the unit unless tests should indicate otherwise.*

Component Testing

Although BuWeps had planned to change over all components now using Mil-L-7808 oil, this has had to be modified temporarily to keep some self-contained helicopter rotor head oil reservoirs and between-overhaul-lubricated accessories on Mil-L-7808 until tests are completed. Mil-L-7808 will be retained in the supply system for these uses and in the event operations are necessary in geographical areas where prolonged temperatures below −40°F may persist.

As often is the case, a better understanding of the merits of one product over another can be explained by photographs. Figures 1 thru 6 are photos of certain critical parts in the hot section of the gas generator of a T56-A-7 engine that has operated on both type oils, and they illustrate the fact that deposits are more severe with Mil-L-7808 oil.

New Problems

Since we have been using Mil-L-23699 oil for a considerable period certain unexpected problems have arisen and should be kept in mind during the transition period. Some of the more important are included below.

Higher Oil Pressure readings have been noted on all components. The average reading at military power on jet engines is about 8 to 10 psi higher than with Mil-L-7808 oil. At the idle and normal power settings it varies from the same to 5 psi above Mil-L-7808 oil. Handbook changes are being prepared to reflect this difference. In some cases it may be necessary to make adjustments in the oil pressure transmitters. On some engines such as the J79, as much as a quart of the Mil-L-7808 oil will remain after draining the old oil. This quart will dilute the Mil-L-23699 sufficiently to lower the viscosity to a level where published oil pressure limits of both oils will be affected. In such cases, a pressure between both values should be selected. As operating time increases, the dilution level will decrease and the oil pressure will return to the published limits for Mil-L-23699. Should this problem persist, the oil should be drained and all components reserviced with new oil.

Odors. On some aircraft that use direct compressor bleed air for pressurization and air conditioning purposes, foul odors have been emitted into the cabin. Oil that drips past compressor seals at shut down enters the bleed air as a vapor after engine lightoff and will persist for a short period. Certain constituents in Mil-L-23699 oil in the presence of moisture form an acid with a pungent odor. No harmful effects result from such odors other than nasal unpleasantness. The strength of this odor is related to the amount of oil leakage into the compressor air stream during startup or during engine transients.

Cost. Mil-L-23699 oil costs twice as much as Mil-L-7808. However, as more qualified bidders are listed, the price will undoubtedly drop. Because of the complex chemical formulations, the Bureau does not expect the price to drop as low as Mil-L-7808 oil.

Compatibility

A question that has been asked frequently concerns the compatibility of this oil with Mil-L-7808 and whether it may be intermixed. By spec this oil must be compatible with Mil-L-7808. However, the intermixing with Mil-L-7808 will affect oil pressure readings in addition to degrading the benefits attained with Mil-L-23699. Should an operating situation require some intermixing on a temporary basis the mixed oil should be drained and the components reserviced as soon as a sufficient quantity of Mil-L-23699 oil is available.

Proven Superiority

Mil-L-23699 oil has proven to be superior to Mil-L-7808 type oils. As fleet operating time increases, many benefits will be realized. In the overall picture these benefits will give us greater TBO, cleaner engines, more durable service from accessories and gearboxes and less oil consumption than previously realized with Mil-L-7808 oils. The Bureau welcomes comments concerning experiences with Mil-L-23699 oil.

The Care and Feeding of Nickel-Cad Batteries

With good maintenance, the inherent advantages of a nickel-cadmium battery, such as long life, good APU starting capabilities, short recharge time and excellent reliability, can be achieved.

There are significant differences between lead-acid batteries and nickel-cadmium batteries. Unless these differences are recognized, improper servicing techniques could result, which, if allowed to continue, would permit rapid deterioration of the battery. The electrolyte in a nickel-cadmium battery is a solution of potassium hydroxide (KOH) which does not chemically react with the plate as the electrolyte does in a lead-acid type battery. Therefore, the plates do not deteriorate nor does the specific gravity of the electrolyte appreciably change. However, the slightest acid contamination will deteriorate the nickel-cadmium battery. The plates of the nickel-cadmium battery are porous, absorbing the electrolyte while discharging and expelling it while charging.

Charging Reaction

The active material of the negative plates in a nickel-cadmium battery is cadmium-oxide. The positive plates are nickel-oxide. A solution of distilled water and potassium hydroxide (KOH) with a specific gravity of 1.24 to 1.30 is used as the electrolyte. The electrolyte is used only as a conductor and therefore the state of the battery charge cannot readily be determined by reading the specific gravity. During charging, the negative plates lose oxygen and become metallic cadmium. The positive plates are brought to a higher state of oxidation by the charging current until both materials are completely converted; that is, all the oxygen is driven out of the cadmium oxide plates and only cadmium remains. The nickel oxide plates pick up the oxygen to form nickel dioxide. Toward the end of the charging process and during overcharging, the electrolyte will gas. Gassing is the result of electrolysis taking place in the electrolyte. The point of gassing is dependent upon the temperature and the charging voltage. A slight amount of gassing is necessary to completely charge the battery. The battery, therefore, will lose a certain amount of water.

Discharging Reaction

During discharge, the reverse chemical action takes place. The negative plates gradually gain back the oxygen as the positive plates lose oxygen. Due to this interchange of oxygen, there is no gassing on normal discharge. In this way, the chemical energy of the plates is converted into electrical energy, and the electrolyte is absorbed by the plate; therefore the electrolyte level cannot be determined on a discharged battery.

Restoring Capacity

One characteristic of a nickel-cadmium battery is that after several hundred charge-discharge cycles, the battery may not deliver its rated capacity. The battery exhibits a "loss of capacity." This loss may be as much as 35 percent of the rated capacity. Personnel accustomed to working with lead-acid batteries could interpret the loss of capacity as a natural aging of the battery. The loss of capacity is normal and must be corrected periodically. However, the ability of a nickel-cadmium battery to deliver full rated capacity can be restored by proper maintenance. The loss of capacity is usually due to cell imbalance, and the cells can be rebalanced and full capacity of the battery restored by constant current charging. The battery has a fast recharge capability and can be recharged from "dead" to full capacity in one hour.

Servicing

Nickel-cadmium batteries should be serviced regularly at intervals determined by experience. One of the criteria used in establishing a service period should be the time required for the battery to use 20 cubic centimeters of water per cell. Since water consumption will vary with ambient temperature and operating methods, experience is the only way of establishing a practical service period. A test, conducted with four batteries, shows this to be close to a four-month period.

As stated earlier, the nickel-cadmium battery plates absorb electrolyte when discharging and expel it when charging. Therefore, distilled or demineralized water *should be added only when the battery is fully charged*. If too much water is added to a discharged battery, excess water may be forced out of the battery when it is recharged.

When gassing occurs toward the end of the charge and during overcharge, electrolysis takes place and reduces only the water content of the electrolyte. The potassium hydroxide tends to remain in the plates, but a minute amount will be carried out with the vapor. The amount expelled is not sufficient to appreciably alter the specific gravity of the electrolyte.

Potassium hydroxide has a high affinity for carbon. Any amount that is expelled readily reacts with carbon dioxide in the air to form potassium carbonate, a white crystal which is non-corrosive, non-toxic, and non-irritating. The potassium carbonate may be wiped away with a clean damp cloth. A brush may be used to loosen the residue, but *a wire brush or solvent should not be used.*

The battery will be charged if the airplane has recently terminated a flight and the battery was not used to operate equipment. If there is any doubt as to the state of charge of the battery, operate the APU, move the DC meters switch to BAT and observe the DC voltmeter and ammeter. They should be pulsing, indicating that the battery is charged. When pulsing begins, the battery can be considered fully charged and ready for servicing. Pulsing will only occur if the battery is being charged from airplane or APU electrical power.

When it is ascertained that the battery is charged, move the battery switch to OFF. Spilled electrolyte may be a sign of cell damage. Wipe away any potassium carbonate which has accumulated, remove the filler caps and check the level of the electrolyte. Add only enough water to cover the bottom of the filler well by 1/16 - 1/8 inch. It is more desirable to have some water in the battery than to allow it to dry out.

When adding water, do not squirt it in, but allow it to slowly run into the cells. This method will provide greater control during filling.

Maintenance Tips

Maintenance tips which will prolong battery life include:

- Add water to the battery only when it is charged. A discharged battery will appear dry and little water will spill out even if the battery is turned on its side. Electrolyte is absorbed into the plates when the battery is being discharged and expelled when it is being charged. Adjusting the electrolyte to the desired level of 1/16 - 1/8 inch above the bottom of the filler well when the battery is discharged may result in the electrolyte overflowing when charged.
- Add only clean distilled water to the battery. There is no need to replenish the potassium hydroxide (KOH).
- Keep lead-acid battery service equipment separate from nickel-cadmium battery service equipment.
- Do not allow the battery to dry out.
- When installing the battery, be sure the thermoswitch button contacts the battery case.

If it is properly maintained, long life and reliability can be obtained from the nickel-cadmium battery. It is important to remember that the battery can be reconditioned using the proper charging techniques and that a battery that may appear to be beyond repair can be rejuvenated at a fraction of the cost of a new battery—which, incidentally, is in the neighborhood of 700 bucks. An understanding by maintenance personnel as to how a nickel-cadmium battery operates, the differences between a nickel-cadmium battery and a lead-acid battery, and the differences in service techniques will aid in obtaining maximum life with trouble-free operation—*Excerpts from "Boeing Airliner"*

ELECTRICAL MAINTENANCE

Every person who works near electrical equipment should exercise extreme care, and be familiar with the hazards involved. Any circuit may be "hot"; it should never be assumed otherwise until a check has been made.

Failure to de-energize circuits before performing maintenance operations is one of the most common cause of shock and fire—and, it often leads to damage to expensive equipment.

Wiring or electrical equipment should never be removed from, or installed on, a "hot" circuit. This includes removal and installation of junction box covers or fuses, when power is ON. Positive means should be taken to ensure that the circuit involved is de-energized.

If it is not possible to de-energize the entire airplane electrical system before performing maintenance on an electrical circuit, the circuit involved in the maintenance operation should be isolated by pulling the circuit breaker. If fuses are to be removed, power must be removed first. Every precaution should be taken to prevent accidental contact of control cable, tools, metal parts, and fuel lines. Accidental cross-contact between electrical components and metal parts whenever flammable vapors are present can have serious consequences. A dummy plug installed in the airplane ground receptacle will prevent inadvertent connection of ground power units.

If a fuse blows or a circuit breaker trips, the cause should be determined before replacing the fuse or resetting the breaker. If a wiring system has been modified, it should be checked against the wiring diagram, and an operational check made before releasing the aircraft for service. Wiring errors can cause damage to equipment and injury to personnel.

When soldering an electrical connection, use solder sparingly. An excess of solder, or solder inadvertently dropped in the wrong place, can short out a circuit.

The AC power distribution panel should not be opened when the battery is ON, when engines are running, or with external power connected to the airplane.

When checking circuit continuity of the fire extinguishing system, cartridge and bonnet must be properly installed in the airplane. This cartridge is similar to a pistol cartridge and could cause injury or death if accidentally fired.

New or repaired equipment should be thoroughly bench-checked before installation on the airplane to guard against shorts. This is extremely important when radar or radio components are concerned. These components should be repaired and tested at locations away from the airplane, and flammable liquids should not be handled within 100 ft. of radio or radar antennas whenever either system is in operation. The use of radar in the vicinity of a fueling operation can have startling results—fuel vapors can ignite with explosive force.

In a test of radar equipment to determine the range of dangerous effects, a radar beam was directed at a variety of objects with the following consequences:

- Steel wool was ignited at a distance of 45 feet.
- A mixture of aluminum chips and gasoline vapor and air exploded at a distance of 250 feet.
- Hand tools became heated and gave off sparks at various distances from the radar source.

The foregoing test results emphasize the need for caution near operating radar or high-frequency radio transmitters.

From these tests and from medical reports on radiation, it is known that excessive amounts of radiation can cause biological damage to the human body, but the body receives a warning signal in the form of heat generated on exposed areas of the skin. It behooves the exposed person to quickly move out of the vicinity of the beam or microwaves.

Because of the long-range electrical arcing effect of radar, good maintenance and housekeeping are essential to safety. This includes the removal of trash, metal scraps, and oil rags, and the education of people in the hazards of radar exposure.

Aircraft ground power generators and rectifiers should not be located downwind or near the fueling points, and should not be connected/or disconnected, or stopped or started during fueling operations.

Electrical systems of ground power units should be kept in first-class condition.

Servicing personnel should be kept especially

alert when working with electric power cables used on motor generator units and tow trucks. Short circuits, arcing across terminals, sparks or backfire flame from the exhaust can ignite flammable vapors. A defective contactor, or a cable with its insulation worn or cut through to the conductor should not be used. It is a good point never to handle the cable when it is "hot" and always to push the button on the generator to OFF and wait for the indicator light to go out before disconnecting the cable from the airplane. Particular care should be exercised during wet weather.—*FSF.*

Don't Destroy the Evidence

By LCDR Z. J. Kowalskey, Jr.
BuWeps F-4/F-8/F-111 Electric
Systems Design Officer

IN RECENT months some operating activities have sent Flight Safety AmpFURs to BuWeps reporting failures of various switches, relays, and other small—but very important—components in the F-4 electric system. Upon receipt of these AmpFURs BuWeps has immediately placed phone calls to the originating squadron to request that the failed component be forwarded to BuWeps for investigation. All too often the failed component has already been discarded.

BuWeps Inst 4700.2A is very specific concerning requirements for holding material for investigation. Quoting BuWeps Instructions won't help the situation, however. Perhaps a look at a typical problem situation will help.

The F-4 is loaded with all types of switches located throughout the aircraft. Failure rates of switches are generally very low, but failures do occur. Consequences of these failures vary considerably. In one case a switch failure could result in inability to turn on the fuselage light. In another case, switch failure could result in engine flameout. Which of these two failures is important and which is not important? As far as BuWeps is concerned, they're both important. The only difference is the degree of importance, which dictates priority of response to the problem.

My own impression is that too many regulations consider a message report of switch failure as completion of one of a long list of routine requirements. It isn't! Any message report of component malfunction could be the first step in providing a solution to a totally unsatisfactory condition.

When a switch fails, BuWeps has the problem of determining what caused the failure. Let's look at a few possible causes.

1. Improper switch design. (Won't do the job).
2. Improper switch application (the switch is good, but has been selected for the wrong use).
3. Poor quality control by the manufacturer (Design and application are OK, but the manufacturer is supplying poor product).
4. Improper switch use (Example: Pilots are neglecting to lift lever-lock switches before actuating, and the dentents are bending or breaking).
5. Incorrect switch installed (Installation goof. Someone put the wrong switch in the correct hole).

Obviously, the best place to start looking for the problem is in the failed switch. There's the rub. Since the switch is not usually repairable, it's thrown away. Two days later when BuWeps calls to get it, no one knows where it is. If failure of a switch is significant enough to generate a Safety of Flight AmpFUR, it seems that someone would be interested enough to keep the switch available for a few days.

This problem is not restricted to switches. The electric system alone consists of many disposable relays, connectors, fuses and lights. Solutions to problems are difficult to come by if the specific problem can't be identified.

If a failure occurs, help BuWeps help you—*don't destroy the evidence*, either by disposing of a failed component too soon, or by tampering with it.

Fly it Anyway?

Do we fix it now, or do we wait until the next check? This has been a problem that will always confront maintenance officers and commanding officers. All agree that any major gripe should be fixed *now* but a minor gripe can wait until the plane comes into check, or until we get the part. The problem with this philosophy is, what is a minor gripe?

Here's a case in point which concerns the old AF-1E *Fury* which was a good fighter converted to an attack mission. With the attack mission came the requirement that the *Fury* act as a tanker. For this purpose, a buddy tank kit was built which would allow the trusty old bird to make like a flying gas station. Engineers figured a system was needed that would prevent the tanker airplane from giving all its fuel to the thirsty buddy aircraft. So, a float switch was devised in the main fuel cell which causes a big red light to come ON at about 900 lbs fuel remaining—a great device to use as the cut off switch for fuel transfer. This seemed like a good idea because now it would be impossible for the tanker to ever get below 900 lbs of fuel.

AF-1E BuNo had flown many hops during a cruise to the exotic Orient. One day our Hero flew BuNo and noted that the low level light hadn't come ON even though the fuel was down to about 500 lbs. This caused Hero to write on the yellow sheet "low fuel warning light inoperative." Hero fully expected that the corrective action block would read "replaced light bulb."

The next day, Hero was again scheduled to fly BuNo. In reviewing the yellow sheets, Hero noticed that his gripe had been written off as "float switch inoperative, parts on order." Hero didn't think this was the best way to write off a gripe so he refused to fly the airplane. Hero's skipper heard about this and proceeded to chop off a few of Hero's tail feathers. As the skipper calmly explained things, this was why we get flight pay; after all we can't expect airplanes to be perfect and as long as everyone knows what is wrong with the airplane there's nothing wrong with flying it. Once Hero had the wisdom of his commanding officer firmly implanted (you know where), he didn't mind flying BuNo with her known problems.

Towards the end of the cruise someone decided that it was BuNo's turn to play the part of tanker and so two large fuel tanks were hung (or is it hanged) from the wings. Now, a pilot whose real name was Murphy was scheduled to fly the Tanker. Murphy knew that the low fuel light didn't work but the skipper had said that this was no sweat. Murphy got airborne in Tanker and completed his mission. He noticed that he still had a little fuel left in the buddy tanks. Tanker had two switches; one put fuel into the buddy tank and the other put fuel into Tanker's system. All Murphy had to do was select the switch that transferred fuel from the buddy tank into Tanker's system. Murphy, being true to his name, selected the "proper" switch. Even if Murphy had selected the wrong switch there would have been no problem because Tanker had a switch which prevented transferring all the fuel from the airplane to the buddy tank and the only thing wrong with Tanker was some minor gripe that had something to do with the low fuel warning light.

Murphy was calmly returning to base when all of a sudden things got awful quiet. He knew that he couldn't have flamed out because he had lots of fuel left. The low level light wasn't ON but that was okay. Only one little problem—where had the fuel gone? Might as well get rid of those tanks; after all, they're empty—or are they?

—Submitted at USC during ASO training

NOTES AND COMMENTS ON MAINTENANCE

Repeat Gripes

One of the most harassing problems confronting maintenance departments is the repeat gripe. To combat the problem VT-28 developed a method by which it effectively reduced repeat gripes from four percent of its total work orders to a low of .06 percent in 11 months. The trend of repeat gripes has been steadily downward since the implementation of the program.

Here are the details in case you wish to adopt the idea.

The program is managed by quality control as a portion of the overall trend analysis effort and involves four steps:

1. Nightly logging of all B-sheet discrepancies by aircraft number.

2. Comparison of these new log entries and previous gripes by the chief inspector to identify true repeat gripes.

3. Completing and routing a Quality Control Report form (Fig. 1) to the division and branch concerned.

4. Shop level investigation, correction of the gripe and reporting the cause of the gripe. Completed reports are returned to quality control for review, further action if necessary, and retention.

A certain number of repeat discrepancies seem to be inherent in aircraft maintenance; but the chief inspector, during his review, attempts to uncover those repeat gripes which indicate incomplete or improper troubleshooting and repair techniques, inattention, unqualified personnel, or material failure trends. After several months at this task quality controllers are able to pinpoint these indications with amazing accuracy.

Upon receipt of a report, the division officer, branch officer and shop chief join forces to determine the cause of the repeat gripe, take corrective action and make necessary recommendations. All of this is passed along to quality control on the completed report. The very infrequent second or subsequent report on a repeat gripe reaches the shop via the maintenance officer who requires an immediate and comprehensive report from the supervisors concerned.

As is the case in any new program, this one met obstacles and resistance in the beginning. Answering repeat gripes reports to the satisfaction of quality control and the maintenance officer embarrassed some supervisors. But once it was conclusively proved that we were dedicated to the success of the program, that benefits would far outweigh embarrassments, and that corrective measures would be constructive and instructive, the quality control report lost the stigma of "report chit" and all supervisors gave their wholehearted support. The success of this program in reducing the frequency of repeat gripes has definitely improved aircraft availability and the overall quality of the maintenance effort. An additional benefit has been reduced frustration for both flyers and fixers.

—Contributed by CDR D. A. Gilles, C. O. VT-28

Quality Control Report

Date .....
No. .....

From: Quality Control Officer
To:
Via:
Subj: Investigation Report, request for
You are directed to investigate the following discrepancy/unsatisfactory trend:
Complete this form as soon as possible and return to Quality Control Officer.
Sig. .....

Action Desired

1. State findings on this problem. Consider design, parts involved, maintenance procedures, supervision, training, negligence, etc.
2. Statement of corrective action taken/intended to be taken.
3. Were other divisions involved? How?
4. Assistance desired (tools, technical information, tech reps, etc.).
5. Do present instructions (CAMI, SAMI, TIMI, etc.) cover this area? ..... If so, are revisions recommended?
6. Other pertinent information/suggestions.

Sig. .....

Division Officer's Comments:
Sig. .....
Quality Control Officer's Comments:
Sig. .....

Fig. 1

FOD Prevention Tip

BECAUSE misplaced tools are among the greatest potential sources of jet engine damage, some outfits have placed greater emphasis on tool control. To permit practical inventory, mechanics kits have been reduced to a minimum standard group of 27 items. Tools are counted before and after

maintenance and any missing items *must* be found before an engine is started.

In addition reflective tape is applied to each tool, so that a flashlight inspection of jet engine or airframe will reveal misplaced tools more readily.

Although a series of checklists, SOPs and briefing guides are the heart of the FOD prevention program, *none of these will work unless they are used conscientiously.* SOP makes the system but it's the supervisor who makes the system work.

The Egg Laying Syndrome

Birds are once again gripped by the egg laying syndrome, an annual event marked by great activity among our feathered friends. At this time they flutter excitedly about with two things on their little minds —laying eggs and building receptacles for same. So charged with adrenalin do they become that they'll build a nest faster than most people would believe possible. Experienced airplane people, however, are well aware of their accelerated construction tactics.

Many birds prefer sheltered spots, which are provided by our aircraft. They'd like nothing better than to build a home for two (or three—or four—or maybe more) in a scoop or engine inlet.

Can't stay up day and night shooing birds away from the aerodrome. Nobody's succeeded in running them off by any means yet. Just maintain your usual professional vigilance and keep winged creatures out of our airplanes. Shut carburetor heat doors when our piston pushers are parked for any length of time. Look carefully all around the airplane for bird-type construction projects. We all know they don't select just engines for their vernal domicile.

Engines and controls work much better when unhindered by sticks, string, cloth, feathers and bird bits. Help stamp out airplane birds' nests.—*AA Maintenance Letter*

Wanted

R3350 QECs for SP-2E and SP-2H aircraft!

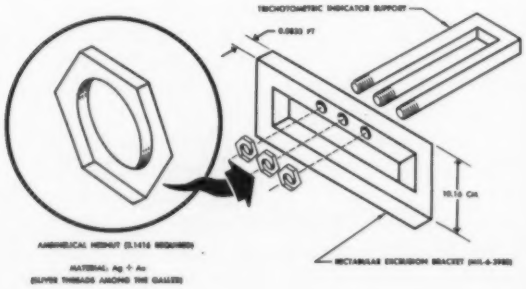
Anyone having knowledge of available QECs please contact me. I need two RD1560-569-2412-ALHA kits and two RM1560-723-0405-ALHA kits. Condition of kits such as overage wiring or hose is not important. Have MILSTRIP standing by to requisition your assets. Call or write CDR D. M. Durtche, AMO, USNAS Brunswick, Maine, 04011.

BIMRAB Meet 11-12 May

THE BuWeps Industrial Reliability Advisory Board (BIMRAB) conference will take place 11 and 12 May 1965 at the Shoreham Hotel in Washington, D. C.

Theme of the conference is "Reliability/Retainability, Fixed Price Management." Representatives of Westinghouse, Air Arm Division; Douglas Aircraft Company; AC Spark Plug; Johns Hopkins; Martin Company; North American Aviation; Lockheed Corporation; McDonnell; General Electric; Lear-Sigler, Inc.; Naval Air Technical Services Facility; and Department of Defense are among those scheduled to make presentations under the general chairmanship of RADM E. E. Fawkes, BuWeps.

Additional information is available from F. W. Snyder, BIMRAB Secretary, BuWeps, Washington, D. C. 20360.



Field Fix

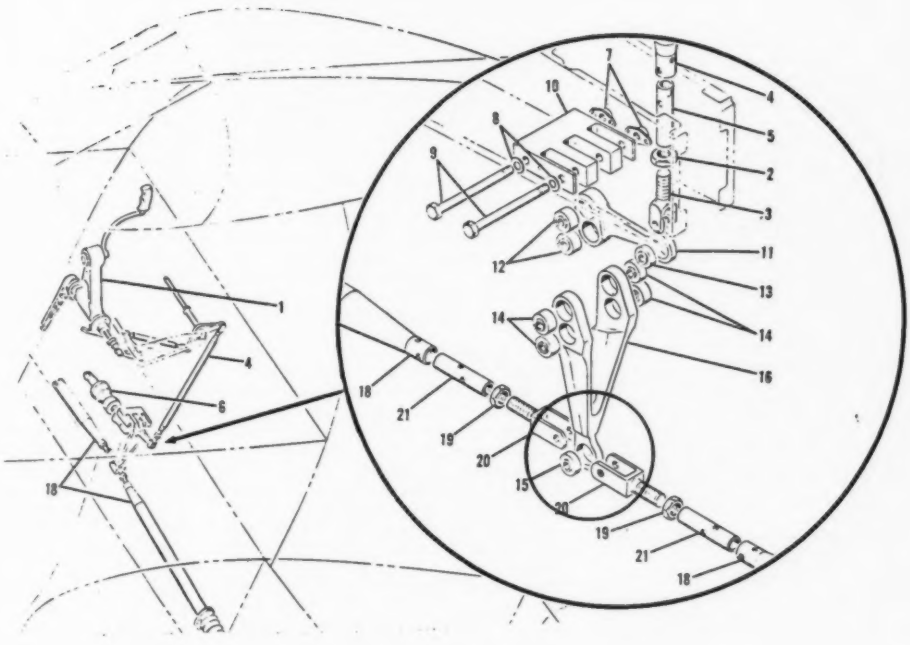
INQUIRIES concerning the mounting of the Trichotometic Indicator Support indicate that some difficulty is being experienced with the brackets which attach the support.

As an aid toward fabricating the support brackets, the accompanying illustration is provided to show the type of material as well as the dimensional data needed.

It will be noted that in attaching the bracket to the support, a special ambihelical hexnut is used. The application of this nut is rather unique in that any attempt to remove it in the conventional manner only tightens it. Because of this design, the nut must be fully screwed on before it can be screwed off.

—Courtesy NAA "Operations & Service News"

MURPHY'S LAW *



Aileron Power Boost Control System

THE following listed part can and has been installed in the reversed position. If done so the results could be tragic.

Part number of 4263167-4, item 16, above, for the A-1H and A-1J aircraft was put into the aircraft in the reversed position rather easily. The lower dog ear (circled) then faced the opposite direction restricting the aileron throw.

Upon taking off and getting lift and surface control speed the pilot experienced control difficulty. If any crosswind is involved, the hazard is even greater because aileron use is required for correctional stability. In the case that brought this condition to light, the pilot had to two-block the control stick to maintain control.

Recommend that the A-1G (AD-5N) also be checked for this possibility since this model is being operated by the Air Force in certain locations.—*Carl E. Heideman AMS1, VA-165.*

Ed.'s Note: Thank you for your concern for our Air Force brethren. The A-1G has a different design in this control system and therefore does not apply.

* If an aircraft part can be installed incorrectly, someone will install it that way!

Letters

Want your safety suggestion read by nearly a quarter of a million people in naval aviation? Send your constructive suggestions to APPROACH.

Flashlight and Computers

FPO New York—We have tried the various types of flashlight holders described and pictured in APPROACH but have always come back to the one we've used for a long time.

Our holder is simply an elastic strap with a pull-the-dot snap located to fit the individual's leg. The flashlight is positioned easily under the strap, and to my knowledge not a single one has slipped loose either on a cat shot or during an arrested landing.

After giving the necessary signals at night, it's easy to slip the light under the strap with one hand. It can also be focused easily on the engine instruments of the A-4 while starting at night before the generator comes on the line.

The strap is simple and easy to make. We like it and thought other folks might, too.

Another cockpit housekeeping problem we've solved is that of keeping the computer off the deck. Probably anyone who has flown the A-4 has dropped his computer at least once, and it's next to impossible to retrieve it while airborne.

We've solved this problem by putting a cord through the center of the computer and attaching it to our knee board. This is perhaps a very old procedure but still works well.

J. L. SKINNER, CAPT
ASO, VMA-331

• Others just might like your procedures at that. We do, and gladly pass them along.

Automatic Relight Route

Washington, D. C.—February 1965 issue letter on "Automatic Ignitors" states continuous ignition possibilities were explored for the J-57 engine as early as March 1963.

In 1960 VAH-4 had one A-3B aircraft equipped with a selective continuous ignition system. It was flown for many hours and was used for takeoff, penetration and landing, and in turbulent conditions. A detailed report was submitted (to BuWeps, I assume) with strong endorsement approving the concept.

The few times I flew the modified aircraft, I enjoyed the added feeling of security provided by continuous ignition during the most hazardous portions of the flights. The system was neither complicated nor costly.

A. MARN, CDR
OPNAV, OP-753
HEAD, WEAPONS READINESS & SAFETY

• To set the record straight NASC yields to CDR Marn. Meanwhile BuWeps and Fleet Readiness Reps, Lant report development, test-cell testing, flight testing and service evaluation of an ignition actuator which will automatically detect engine flameout in flight and actuate the igniter plug to accomplish relight of J57 engines in the F-8s and A-3s. Local Engineering Specifications (LES) have been prepared and installations are underway. Others should also be enjoying the feeling of added security during the more hazardous portions of their flights, thanks to these early efforts.

Emergency of the Day

NAS Jacksonville—Our daily flight schedule contains an "Emergency of Day" item which is submitted by the safety officer or the NATOPS officer.

Recently the published emergency situation was "Ordnanceman reports a Mk 43 torpedo in the bomb bay."

That very same day one of our crews had this exact situation occur during a torpedo exercise flight.

Each morning, in the "All Officers' Meeting," we take a few minutes to discuss the "Emergency of the Day." The time and effort spent on this program is minimal and yet it pays dividends by motivating our crews to study the aircraft systems, the weapons it employs and NATOPS procedures.

A. J. CARNEGHI
CO, VP-18

• We've been getting a number of good safety program tips from various squadrons lately. This one is excellent. Looks like a good way to keep all the flying folks on their toes. Might be adaptable to ground safety program also.

Lox System Handling

NAS Anymouse—During quality control inspection of ground support equipment in this AMD, I observed a man working with a lox trailer and was shocked by these observations. The ASMAN was using an oily collection of tools (adjustable ford wrench, water pump pliers and combination wrenches) to disconnect lines in the system. His hands were oily and dirty and consequently the hood of the lox trailer was oily inside and out.

Asked if he was aware of the dangers involved when hydrocarbons come into contact with oxygen, he replied, "Oh, that's all right, it's going to be purged after I get through with it anyway."

This man had no idea of the dangerous situation he had placed himself into, nor the danger he had imposed on other personnel and equipment.

QUALITY CONTROLLER

• Anyone concerned with the handling lox equipment should first familiarize themselves with the contents of BACSEB 5-56 and Chapter 12 of NavWeps 00-80T-96, "Aircraft Support Equipment, General Handling and Safety

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

Manual." Failure to do so may result in purging themselves and possibly others from this good earth. Supervisors of lox equipment maintenance, please take note.

Good Thinking

FPO, San Francisco—Many articles in APPROACH deal with hairy tales, errors, omissions, faults, failure and suggested corrective "after the fact" action. I am writing about an occurrence which happened several years ago. It was handled in a manner worthy of mention as an "old pro" which APPROACH used to present as "kudos" for jobs well done.

On Okinawa an OH-43D was working in the same area as three UH-34Ds. One UH-34D crashed close to a mountain camp site. Within minutes the OH-43D, piloted by Capt. G. G. Evans of VMO-2, was at the crash.

"Upon arriving I could see the crashed helo lying on its side," he said. "The wind was from the south, blowing the flames in the direction of personnel and equipment located about 150 feet from the downed helo. I could see that there was a good possibility that the troops and gear could be consumed by fire."

"I maneuvered over the edge of the fire between the crash and the equipment area. The downwash was very effective in containing the fire. I hovered for about 25 minutes until the fire subsided enough so as not to be of any immediate danger, and then returned to base."

I would like to add to Capt. Evan's statement the fact that the other two UH-34Ds were unable to assist because of internal and external loads. Though there were no casualties in the crash, the terrain consisted of heavy undergrowth and large trees and the troops

Camp site above, crash site below

would have been unable to outrun a fire if it was allowed to get out of control. Of course the valuable heavy equipment at the camp site would also have been damaged or destroyed.

I believe that the pilot's unhesitating desire to assist and his instantaneous action prevented this mishap from developing into a disaster.

W. R. RIDDELL
CAPT, USMC, VMO-2

White-Out

Christchurch, New Zealand—I am stationed with Antarctic Support Activities and thought the enclosed article which appeared in the 4 February *Christchurch Star* might be of interest. The aircontrolman involved was Chafin, AC1 who was attached to Det. Bravo at the time.

CUTHRIE RILEY, AC1

• **Glad you sent the story, Riley. For the benefit of others a quick paraphrase follows: In the Antarctic midwinter of 1964 a Navy C-130 flew into McMurdo Sound to evacuate a severely injured man. Behind the success of the flight is another story.**

Preparing the landing area for the C-130 was complicated by storms which piled large snowdrifts on the "ski-way", undoing the labor of previous hours. During one of these storms the driver of a D-8 tractor (a huge thing weighing as much as 24 medium sized automobiles) was going from the work area to the camp area. Suddenly he became caught in a whiteout. The horizon and surface melted into one. Driving in these conditions is like skin-diving in a sea of milk. Sense of direction is lost and it's easy to get lost.

Pondering the fact that the storm could last for days against the dangers of trying to grope his way back to the safety of the camp, the driver used the last facility he had at hand—his radio.

The tower controlman who answered the call was taken aback by the strange request for "taxi" instructions from a D-8 "pilot." Switching from "scan" to "taxi" sweep, the controller acknowledged the tractor as a radar contact and began guiding the driver. It was all "stop," "turn right," "go slowly." Foot by foot the D-8 moved around obstructions, past soft spots until the lights of the camp came into view.

Roger Ball

USS INTREPID—

How could your editor be so craven
As to make my CO rant and raven
By giving not even one little hint
Of our part in getting "Roger Ball"
in print.
For the picture, doctored just a dab
Was a product of our ship's photo lab.
It shows our faithful BORDELON
And clearly she is not alone.
And now my knee doth bend.
Please tell him for my sake
That we the release did send
And she's in INTREPID's wake.

F. C. NELSON, JR., LCDR

• **We fill the air**
With grief and woe,
And apologies come
And excuses go.
So, let's give credit
Where credit is due
The picture's credit
Belongs to you.
Black and blue hands
That smart a bit
Beg your forgiveness
For overlooking it.

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Vol 10 **approach** No 11

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

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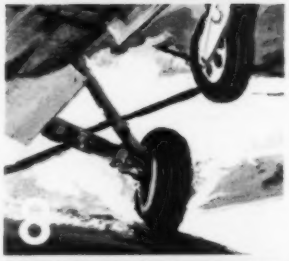

NavWeps 00-75-510

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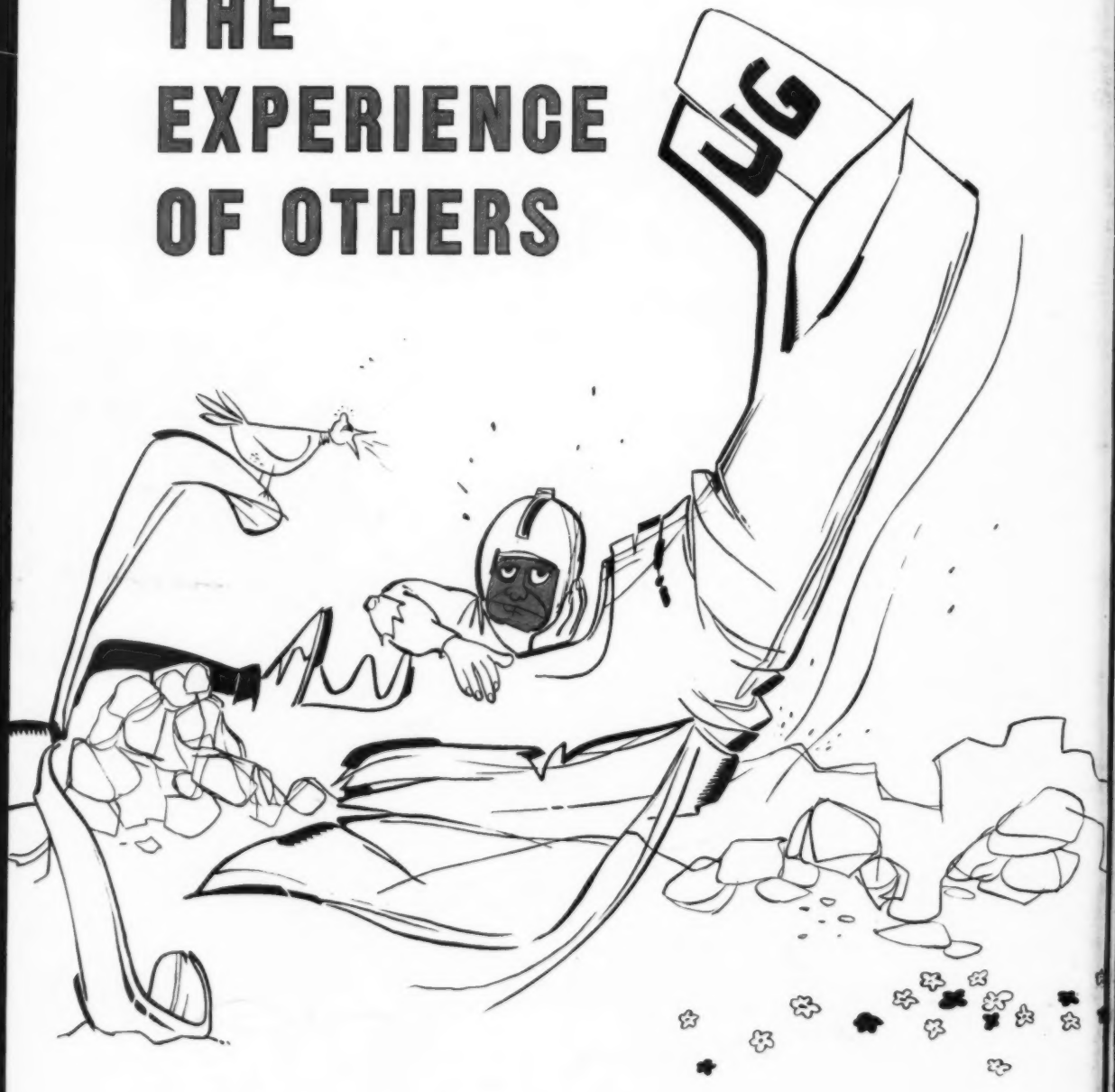
Conventional Weapons

"During the past ten years, nuclear delivery has received major emphasis with a resultant degradation of both knowledge and delivery capability relative to conventional weapons. We have become so enamored with the 'big boom' that apathy is shown when 'iron bombs' are mentioned. Three of the pilots on this flight were relatively experienced, each with over 1200 hours of flight time. That they entered so blindly into this tragedy is an indication of the sad lack of conventional ordnance knowledge which existed in this command, and it is my belief that many similar deficiencies exist elsewhere. As proof of this statement I cite conversations with junior pilots in other squadrons subsequent to this accident. They all exhibited little concern for their own safety under similar circumstances and many of the jet aviators believed that their higher speed would preclude this happening to them.

"Relevant to this misconception is the training accomplished initially in the CRAW squadrons and later at the pilot's local command. Large charts are usually displayed which depict minimum altitude bombing patterns with releases at 50 to 200 feet. One of the competitive exercises is based on this maneuver. During practice, the pilot flies around and around the target, dropping a Mk 76 practice bomb on each circuit. Again and again the pattern is called either minimum altitude bombing or mast head bombing instead of napalm practice, which it really is. While I admit that live bombing runs made at such altitude may be safely completed against suitable targets, using the proper fuses, the occasions for their use in either practice or actual combat are severely limited. It is therefore recommended that all low altitude, conventional weapon patterns be termed 'NAPALM exercises' vice 'BOMBING' so that any connotation that it is safe to drop bombs at such altitude will not be fostered. . . ."—**from an AAR endorsement**

Contributed by LT G. R. Raymer, VAW

NATOPS, THE EXPERIENCE OF OTHERS



Experience keeps a dear school, but fools will learn at no other.
Benjamin Franklin

er, VAW

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